

Fig. 1
(Prior Art)

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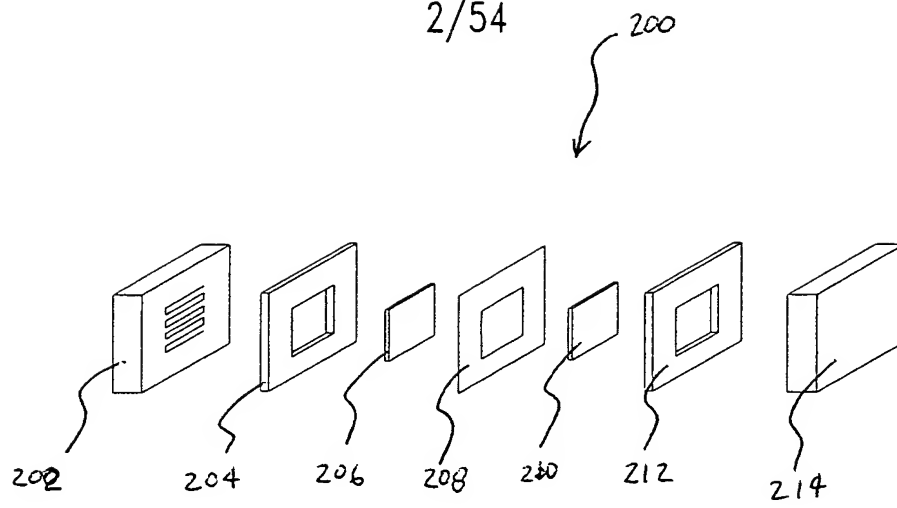


Fig. 2A
(Prior Art)

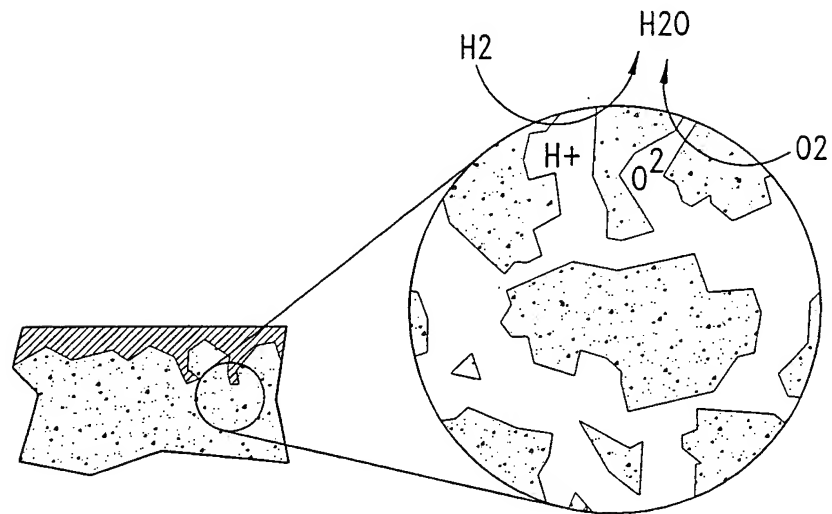


Fig. 2B
(Prior Art)

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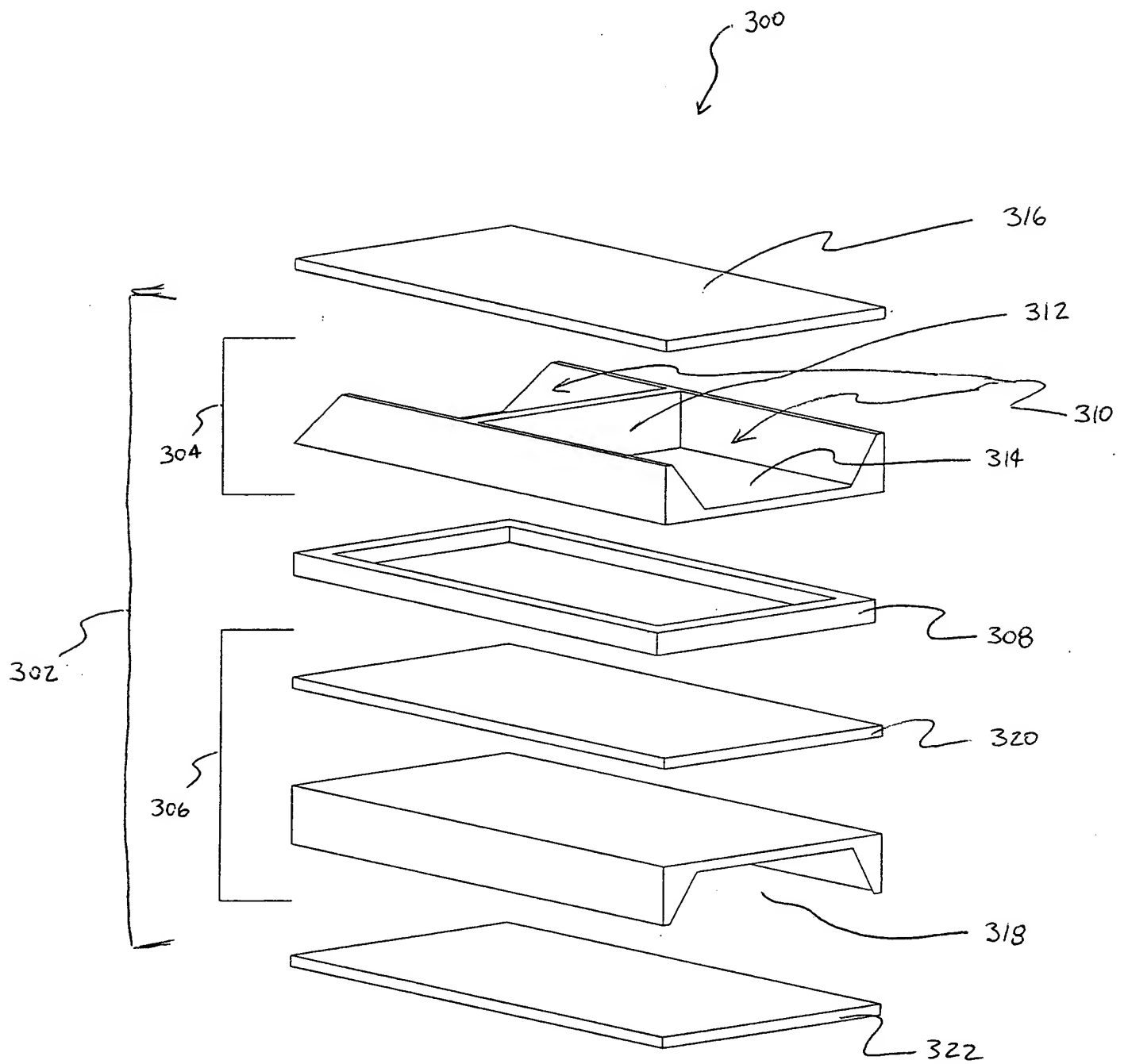


Fig. 3

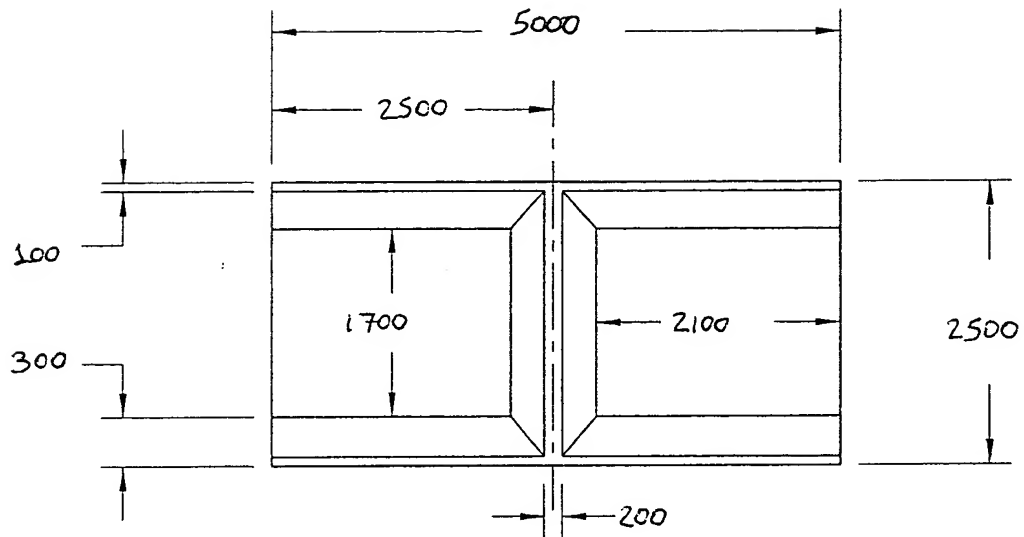


Fig. 4A

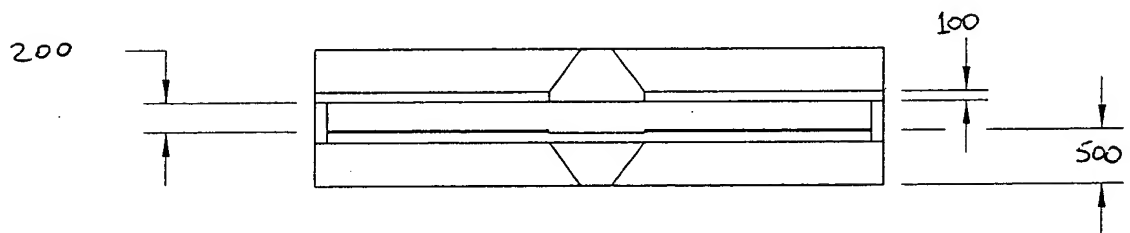


Fig. 4B

Dimensions in microns

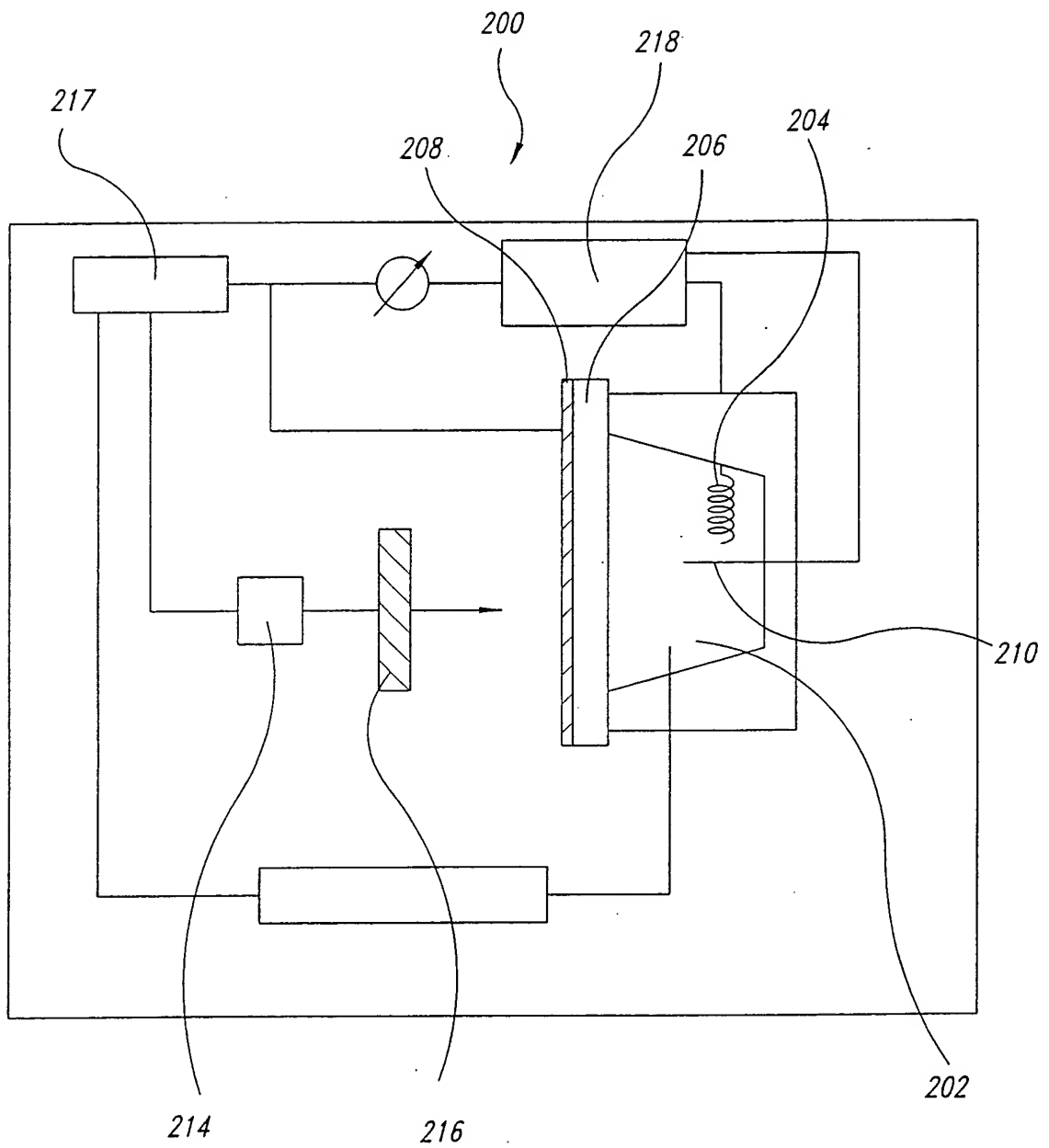


Fig. 5

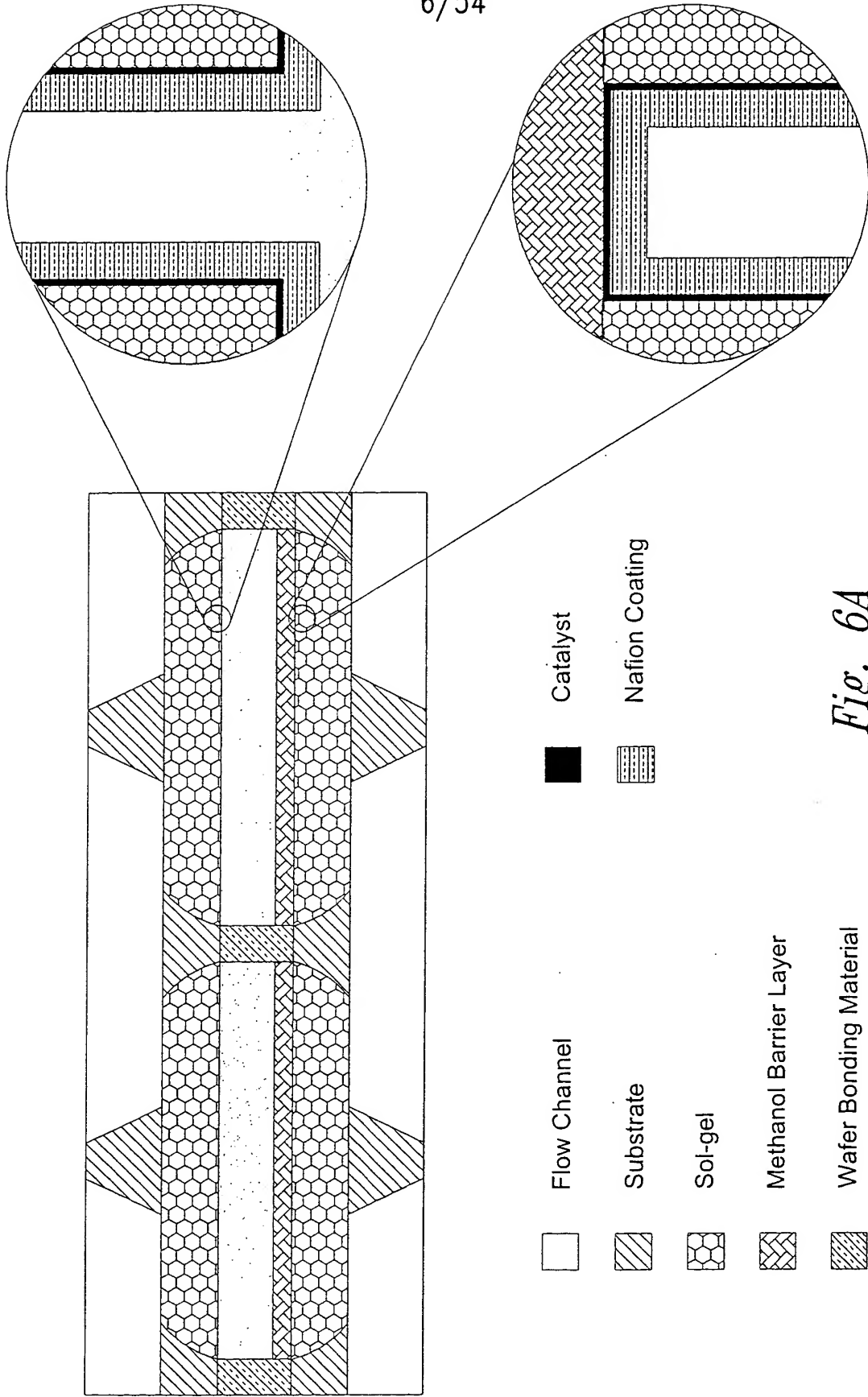


Fig. 6A

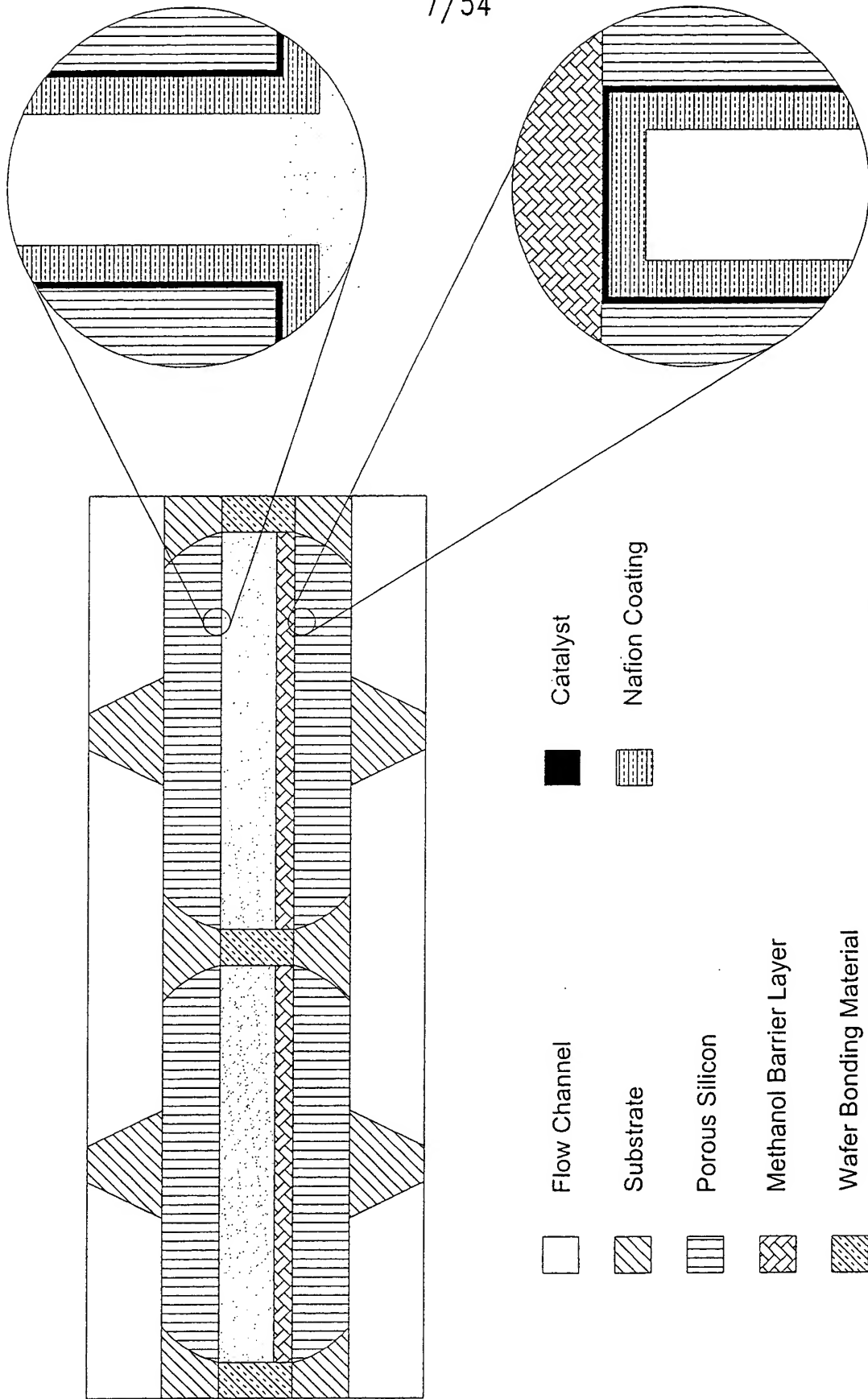


Fig. 6B

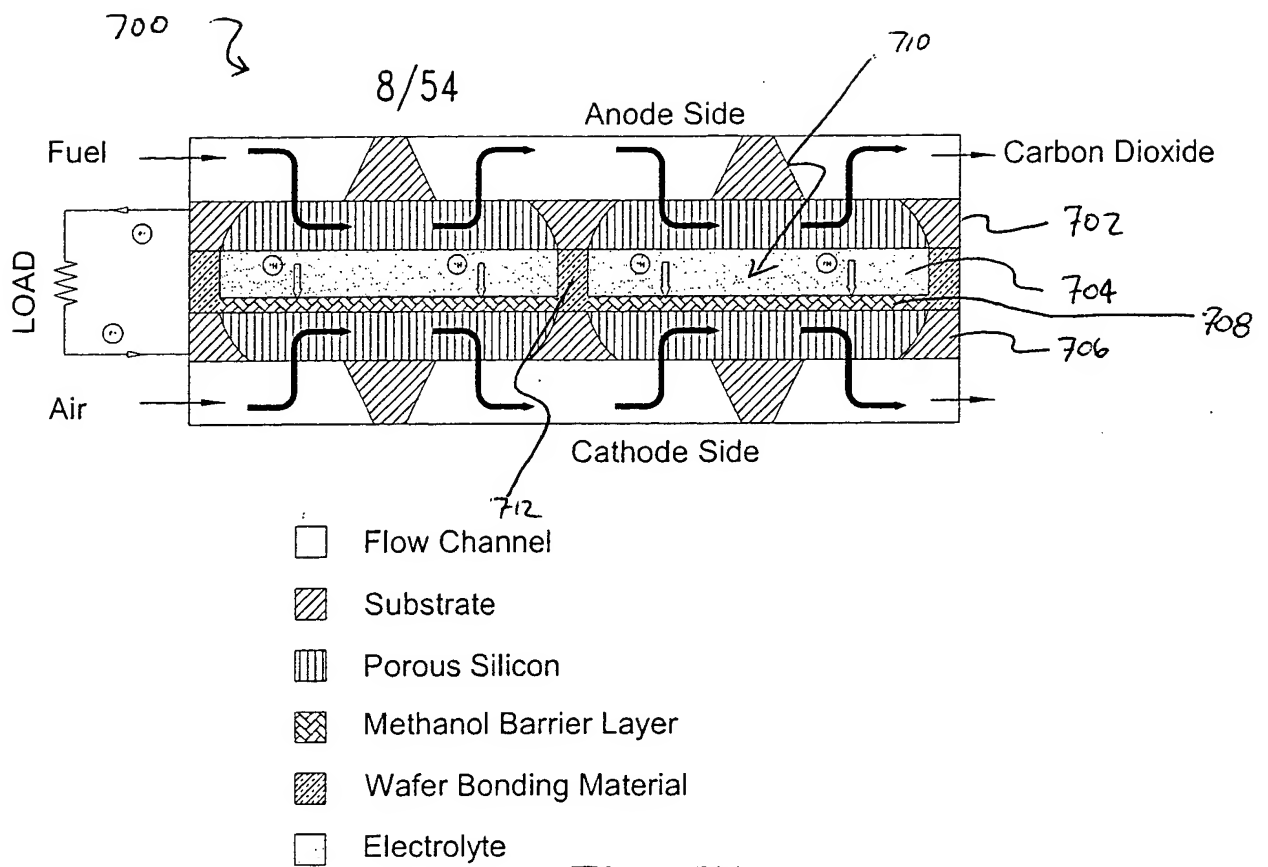


Fig. 7A

Top View (Anode and Cathode are similar)

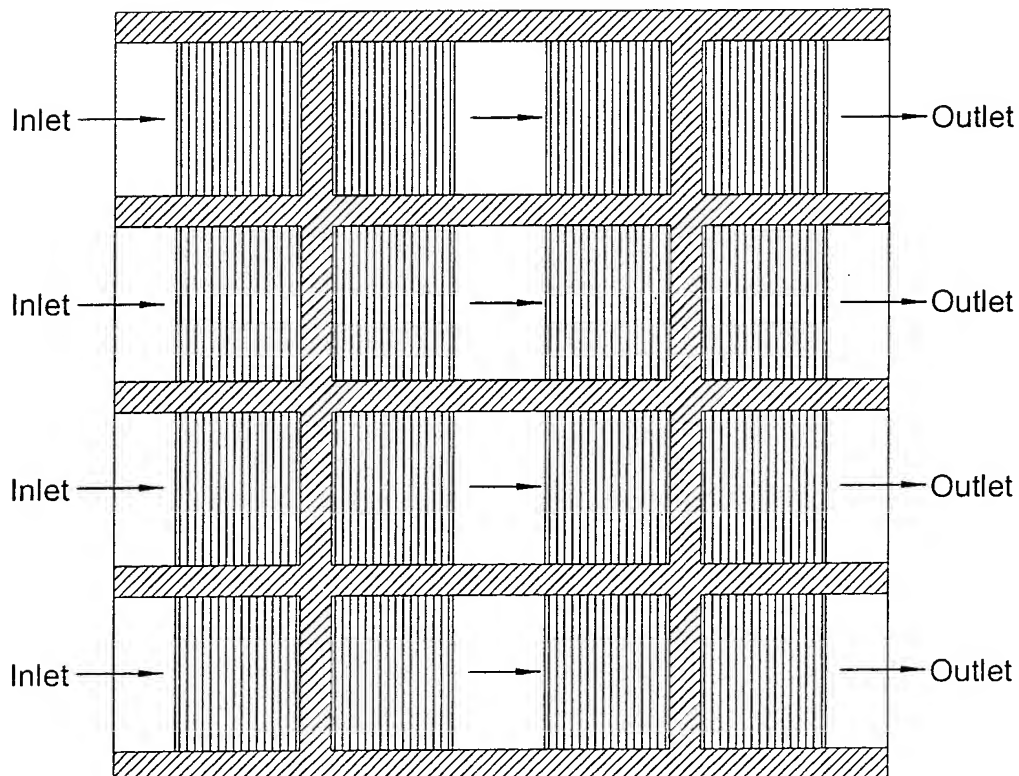
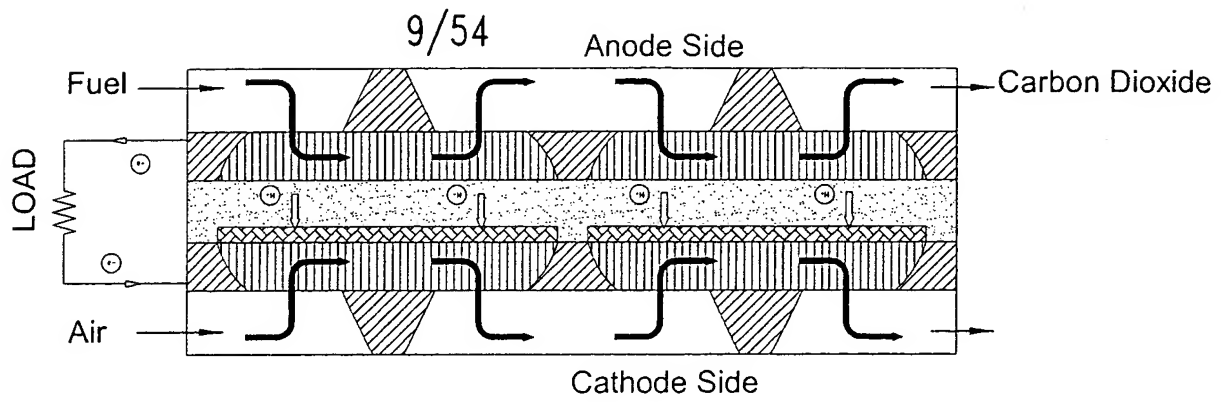


Fig. 7B








-  Flow Channel
-  Substrate
-  Porous Silicon
-  Methanol Barrier Layer
-  Electrolyte

Fig. 8A

Top View (Anode and Cathode are similar)

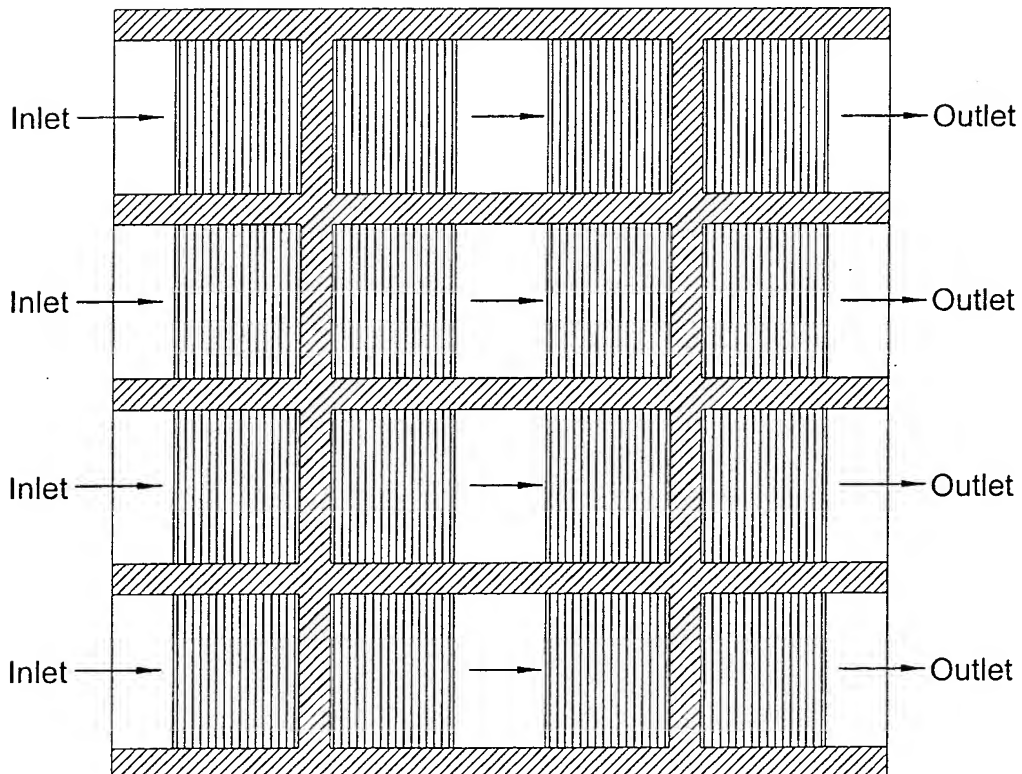








Fig. 8B

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-  Flow Channel
-  Substrate
-  Sol-gel
-  Methanol Barrier Layer
-  Wafer Bonding Material
-  Electrolyte

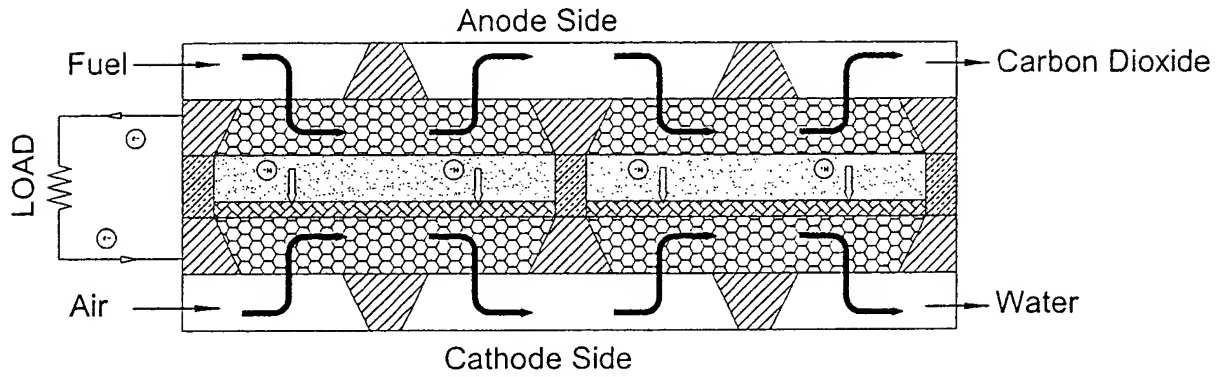


Fig. 9A

Top View (Anode and Cathode are similar)

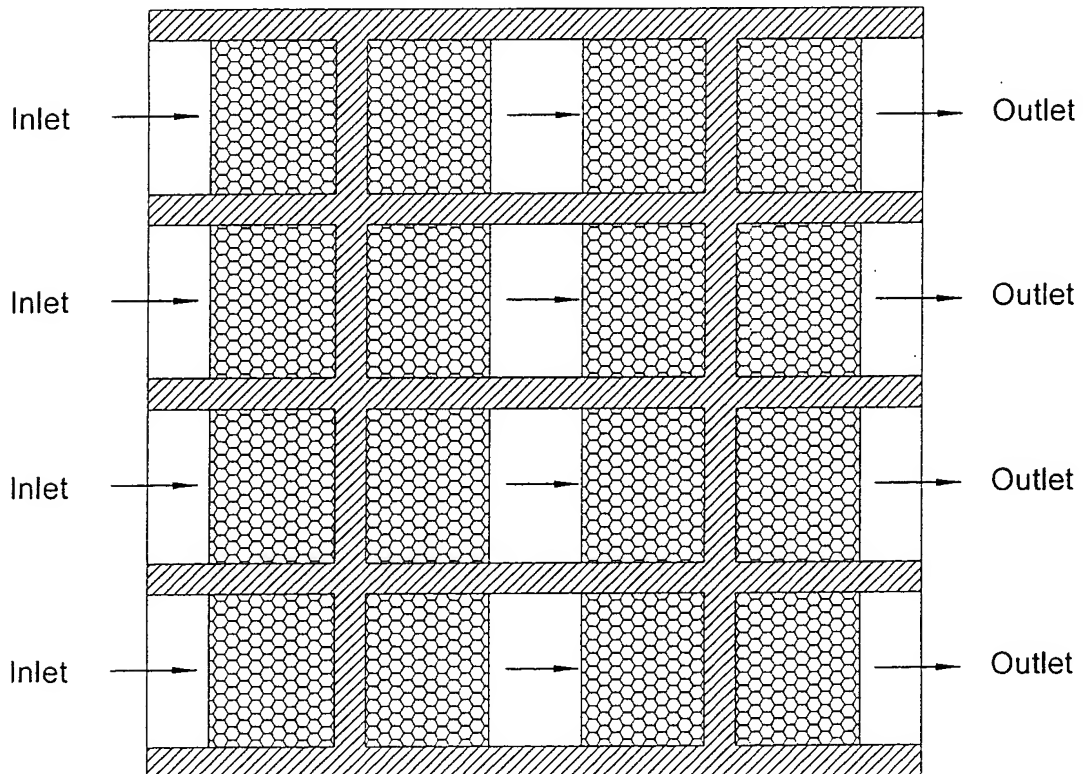


Fig. 9B

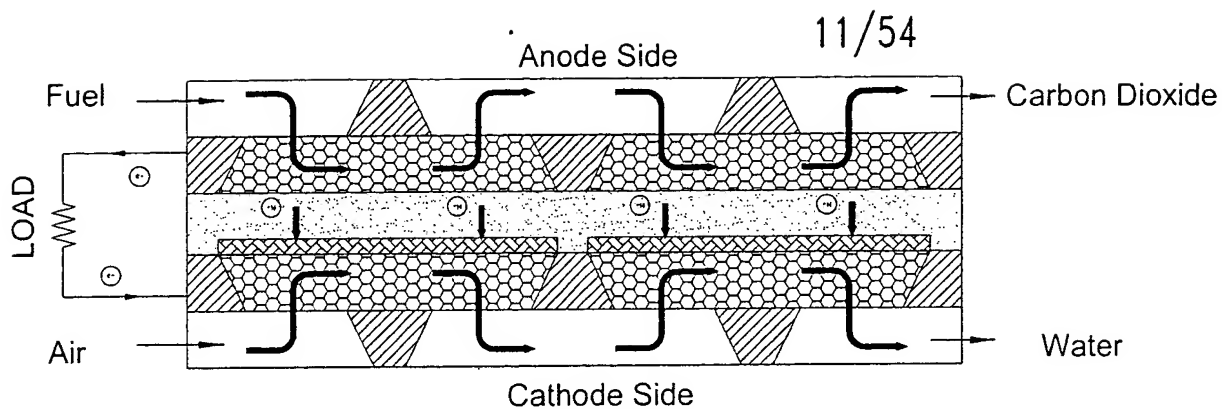


Fig. 10A

Top View (Anode and Cathode are similar)

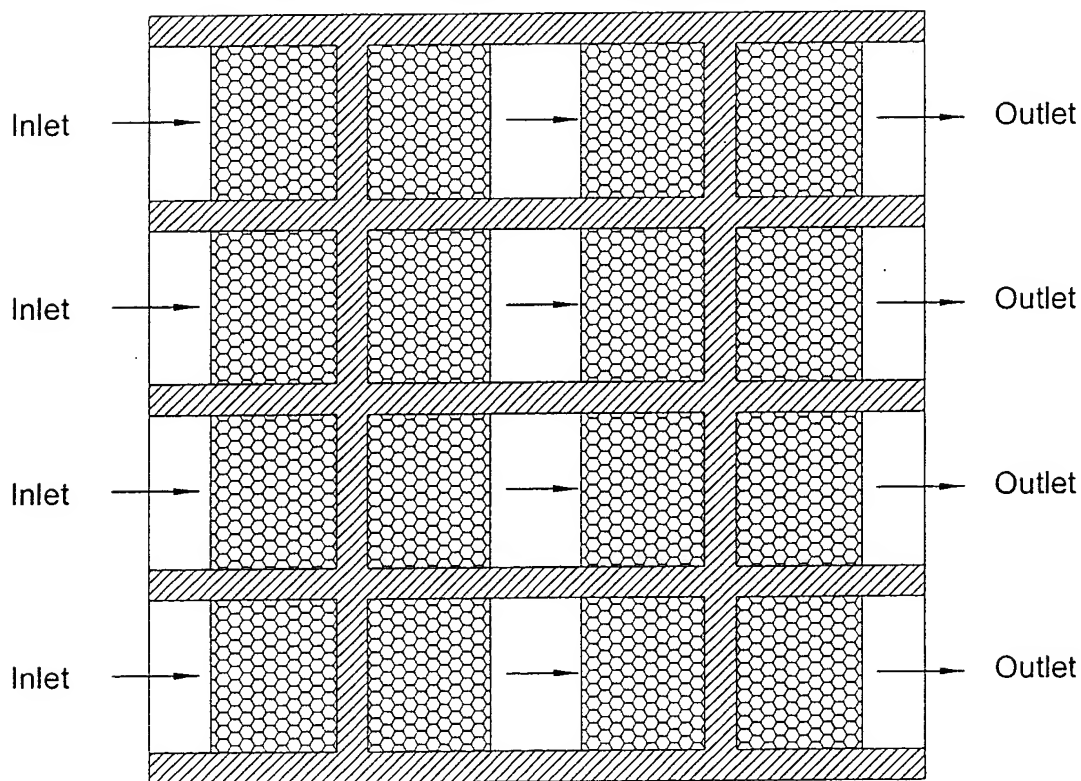
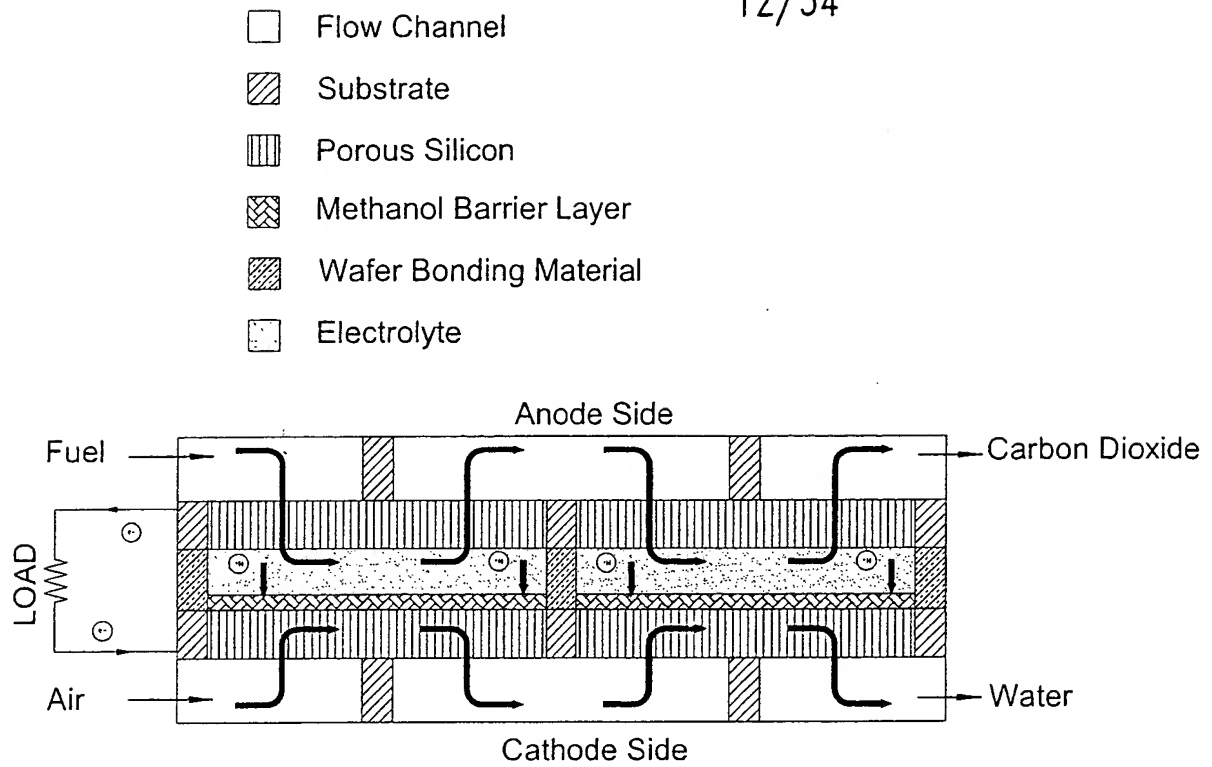
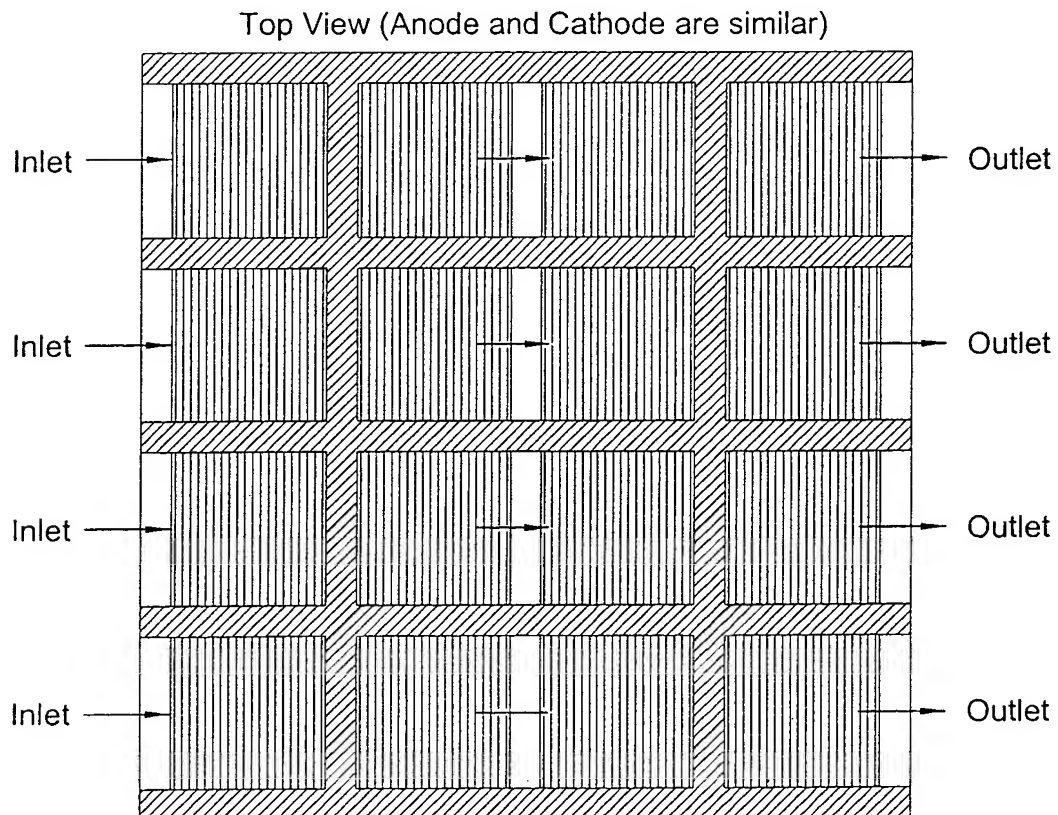





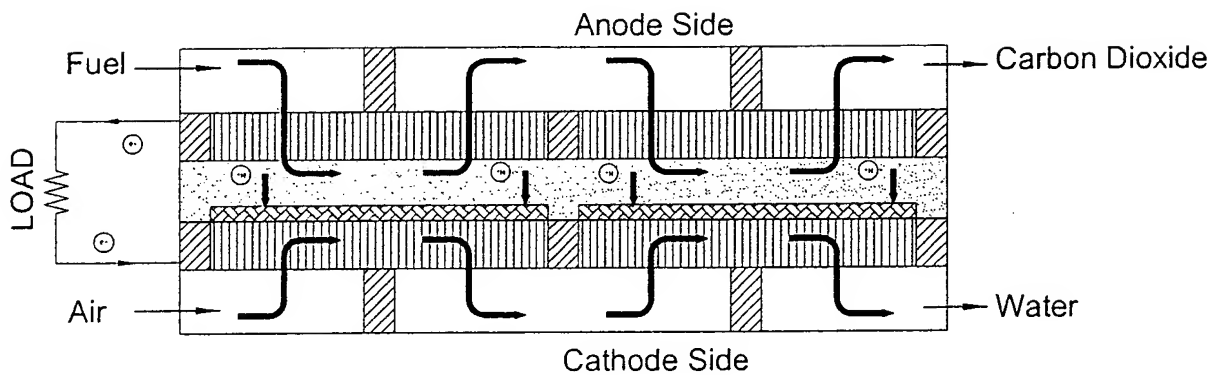
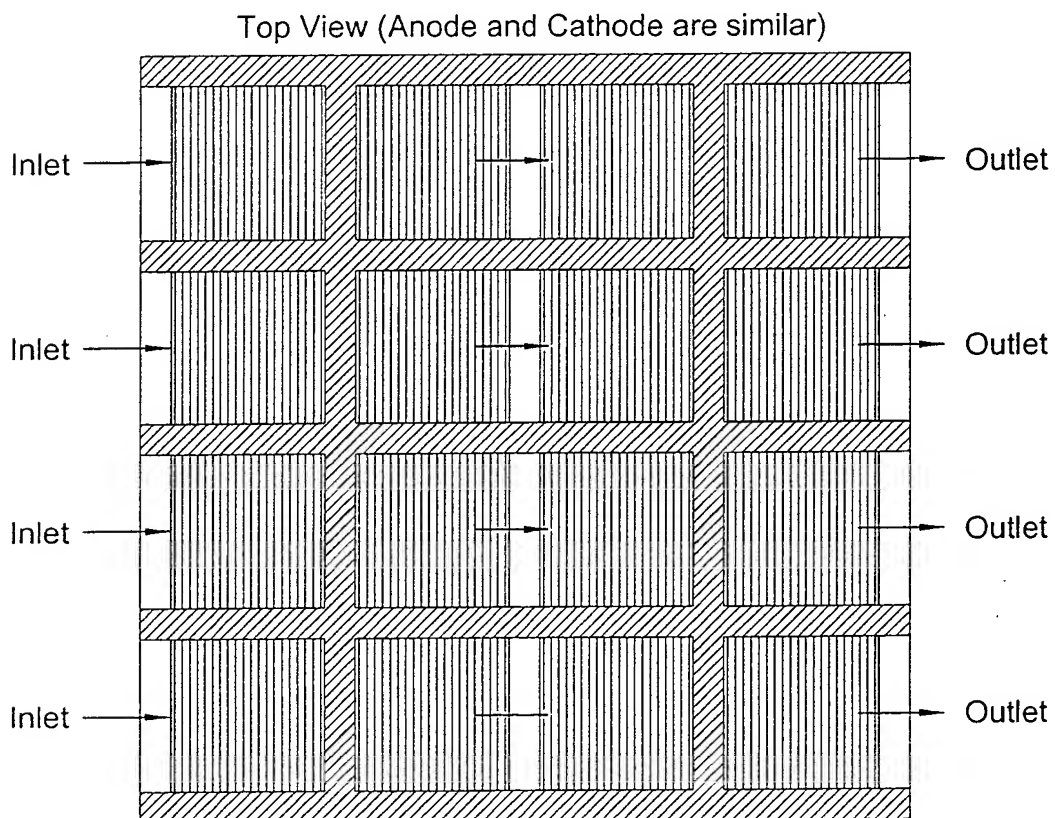








Fig. 10B

*Fig. 11A**Fig. 11B*

-  Flow Channel
-  Substrate
-  Porous Silicon
-  Methanol Barrier Layer
-  Electrolyte

*Fig. 12A**Fig. 12B*

-  Flow Channel
-  Substrate
-  Sol-gel
-  Methanol Barrier Layer
-  Wafer Bonding Material
-  Electrolyte

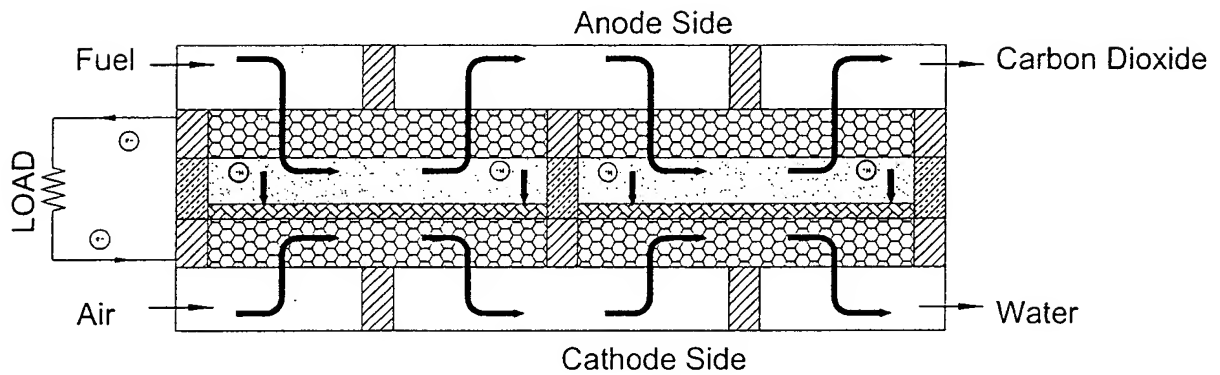


Fig. 13A

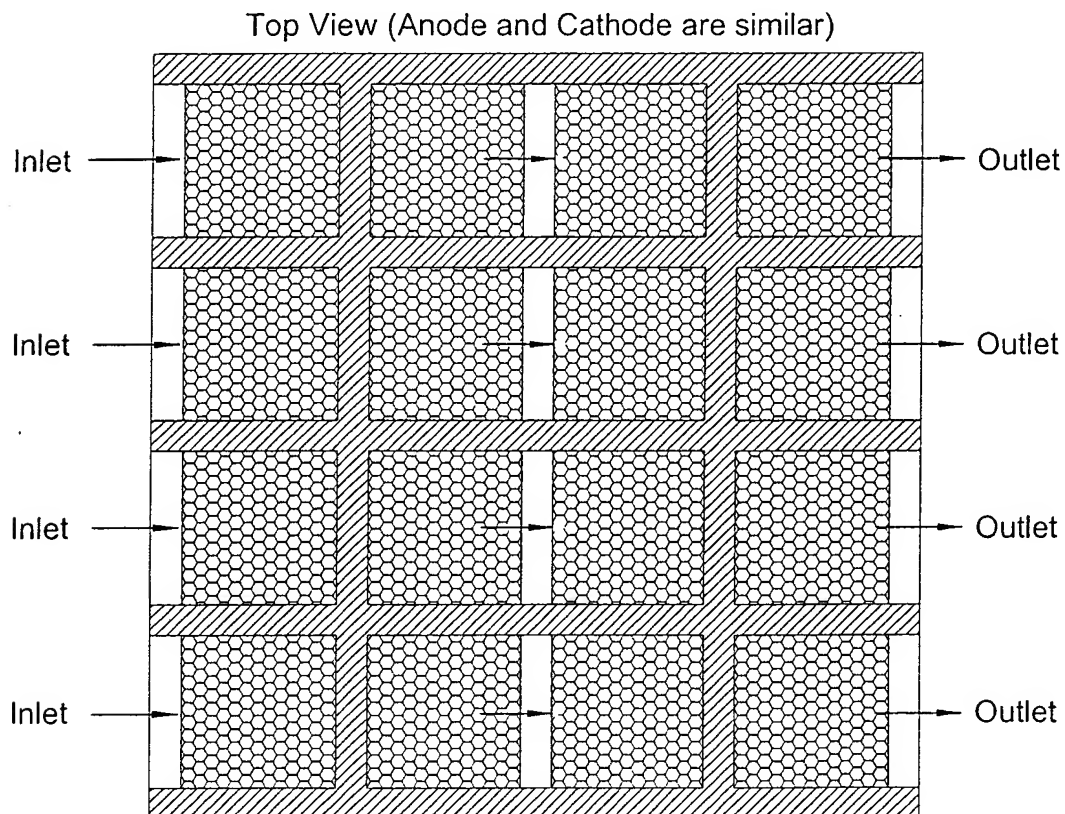





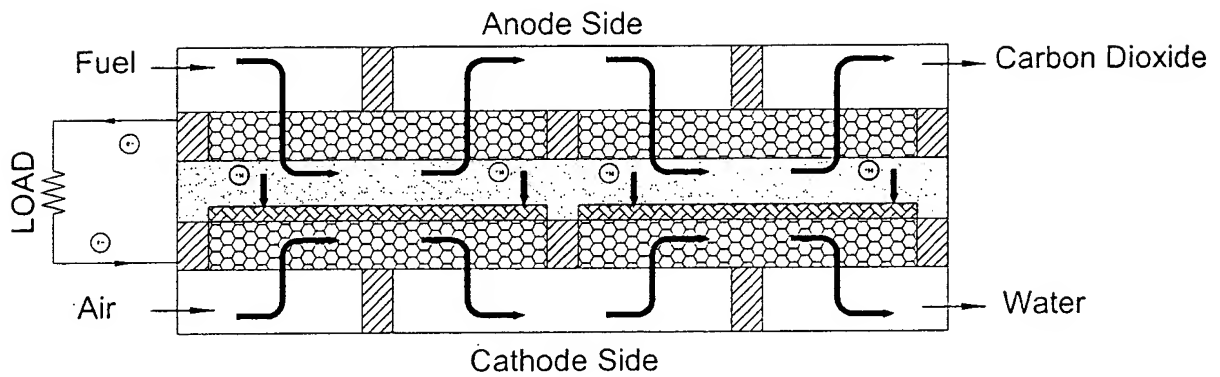
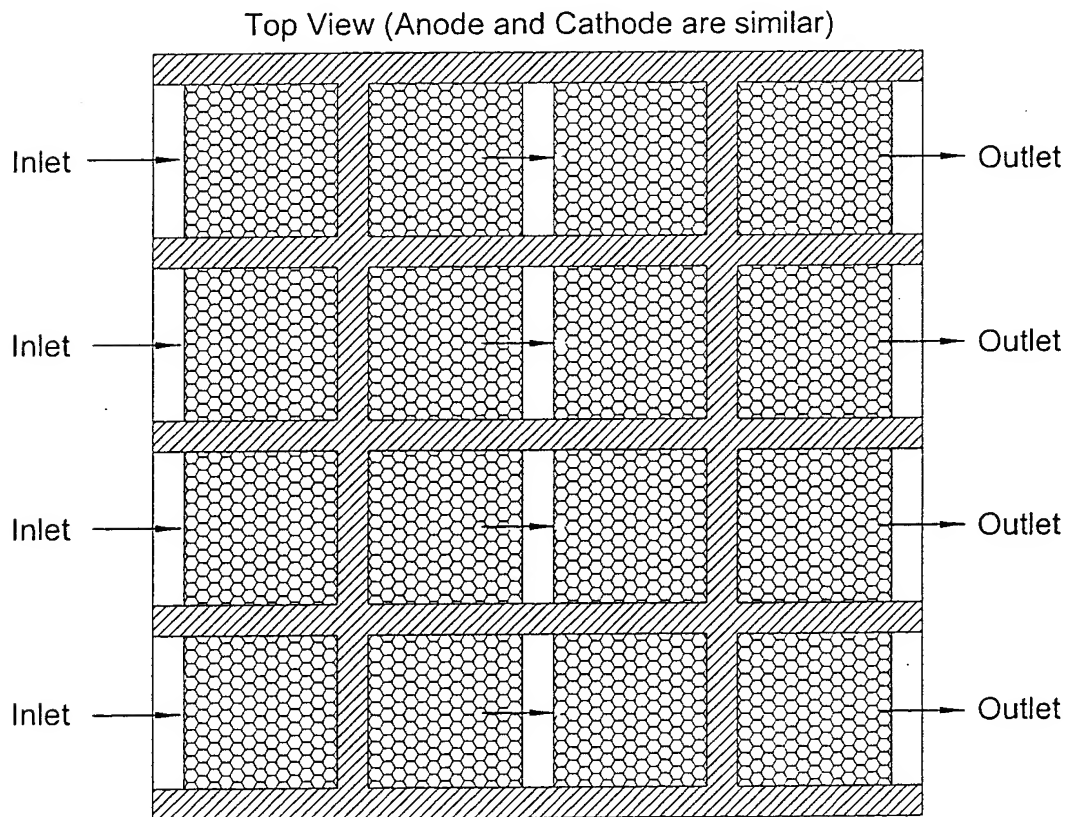
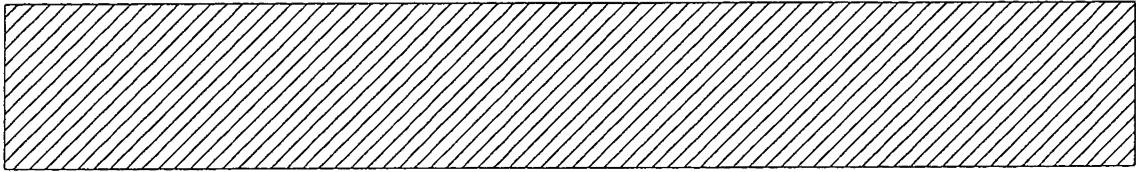


Fig. 13B

-  Flow Channel
-  Substrate
-  Sol-gel
-  Methanol Barrier Layer
-  Electrolyte

*Fig. 14A**Fig. 14B*

Side 1 (S1)

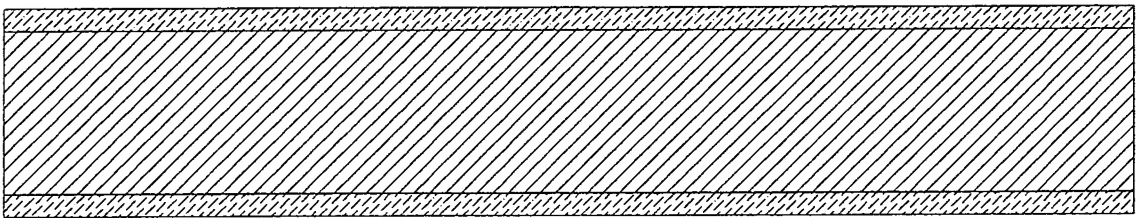


Side 2 (S2)



Substrate

Fig. 15

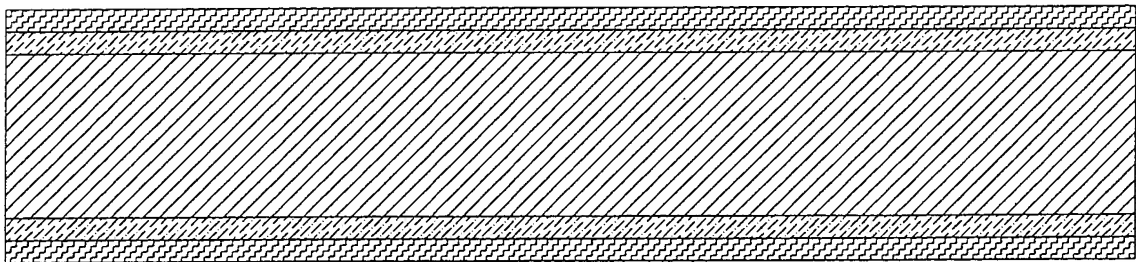


Silicon Nitride



Substrate

Fig. 16



Silicon Nitride



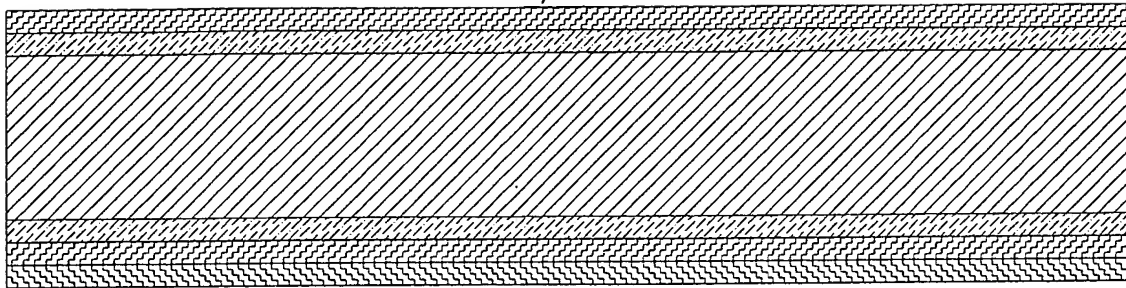
Substrate



Hexamethyldilazane

Fig. 17

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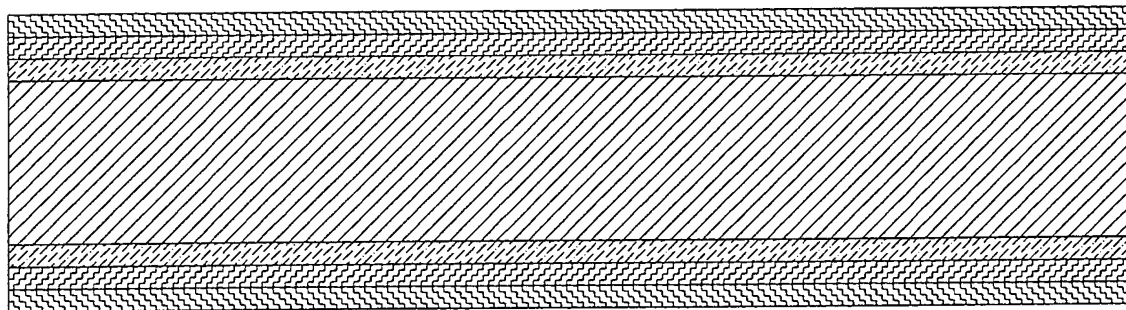
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 18







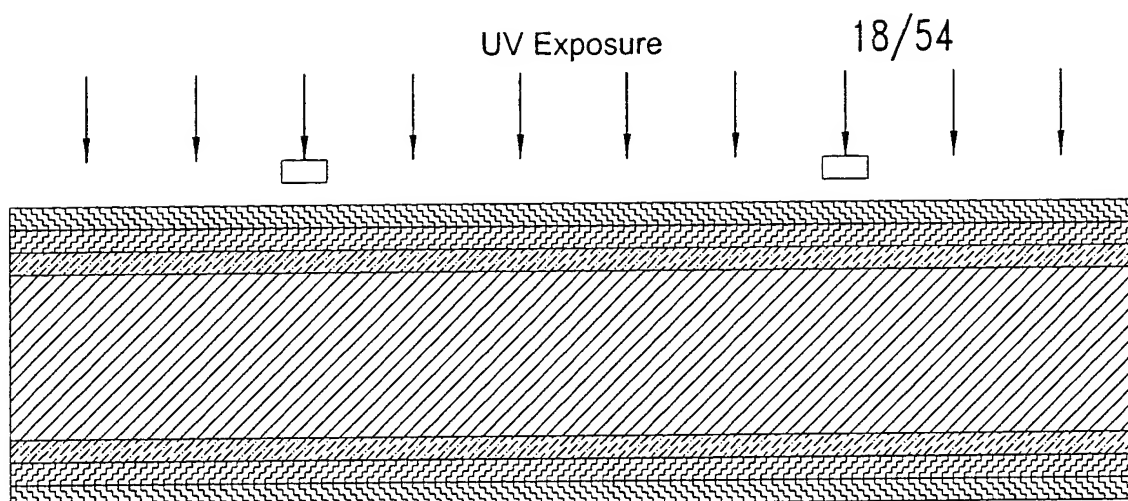
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 19







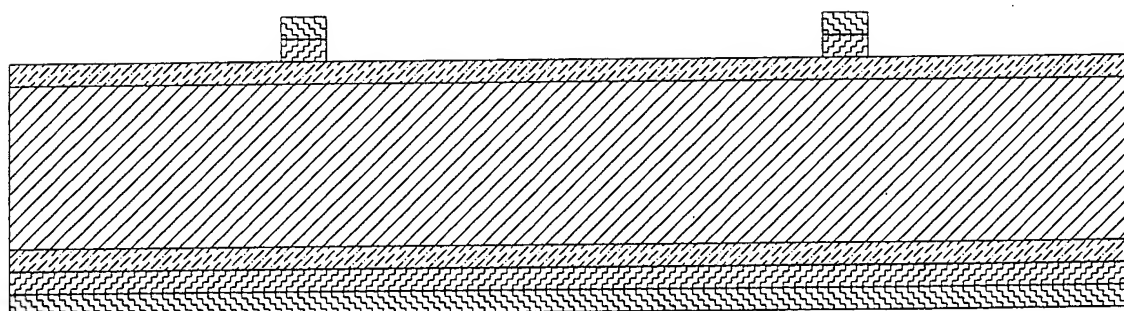
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 20







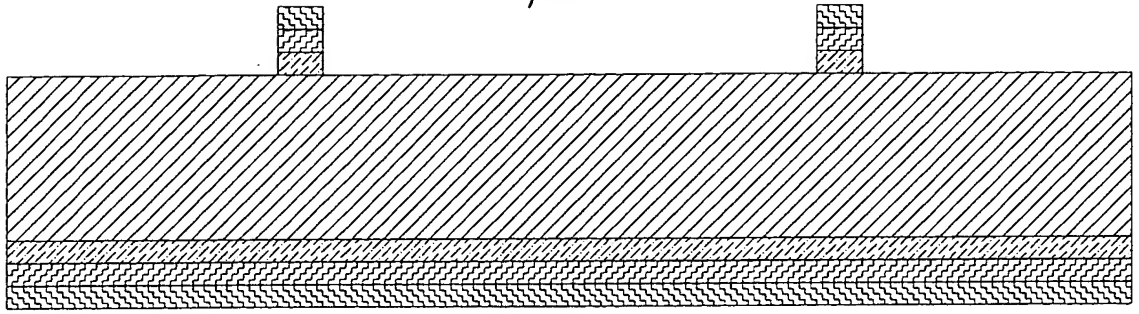
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 21

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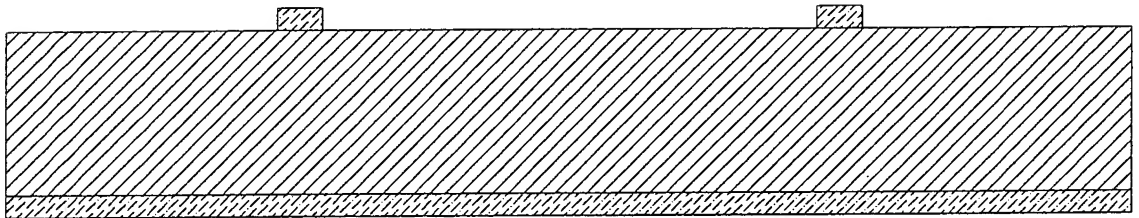
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 22





-  Silicon Nitride
-  Substrate

Fig. 23

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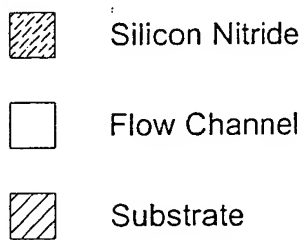
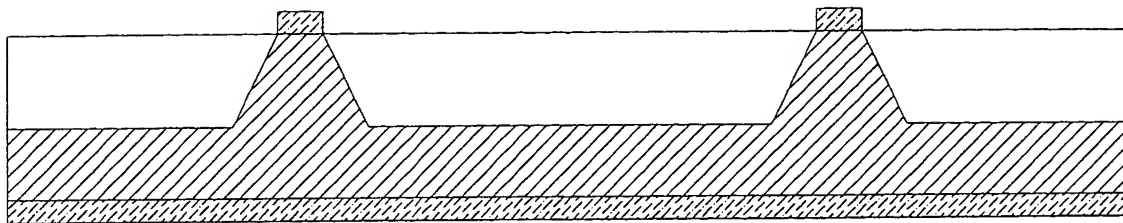


Fig. 24

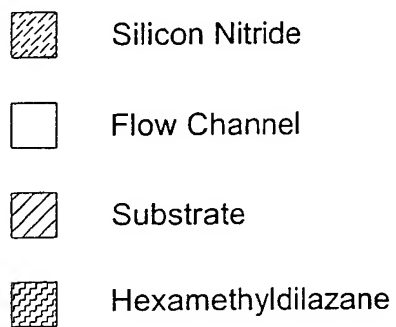
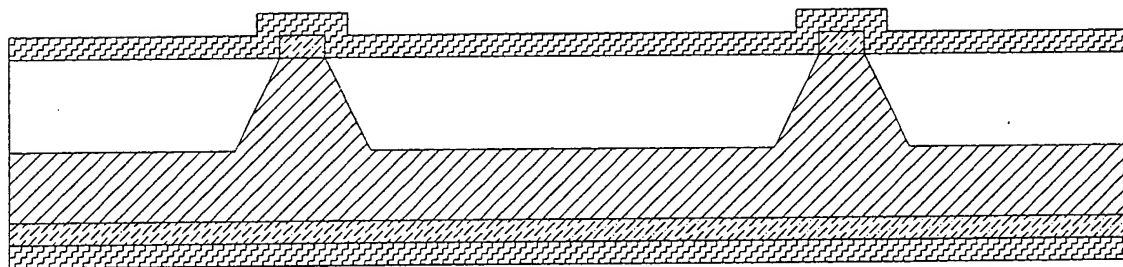
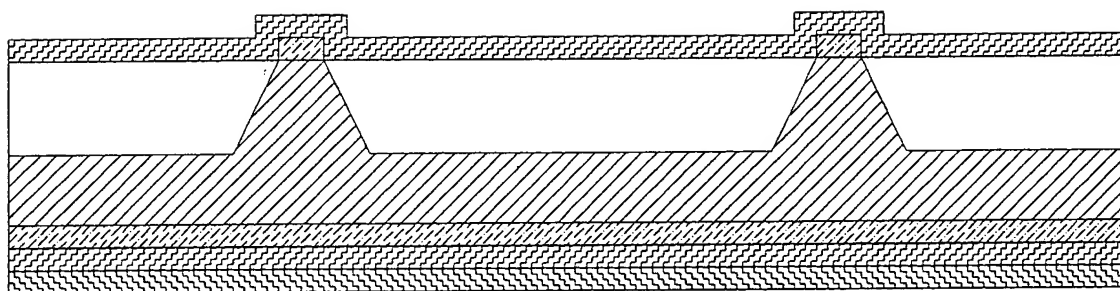


Fig. 25





-  Silicon Nitride
-  Flow Channel
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 26

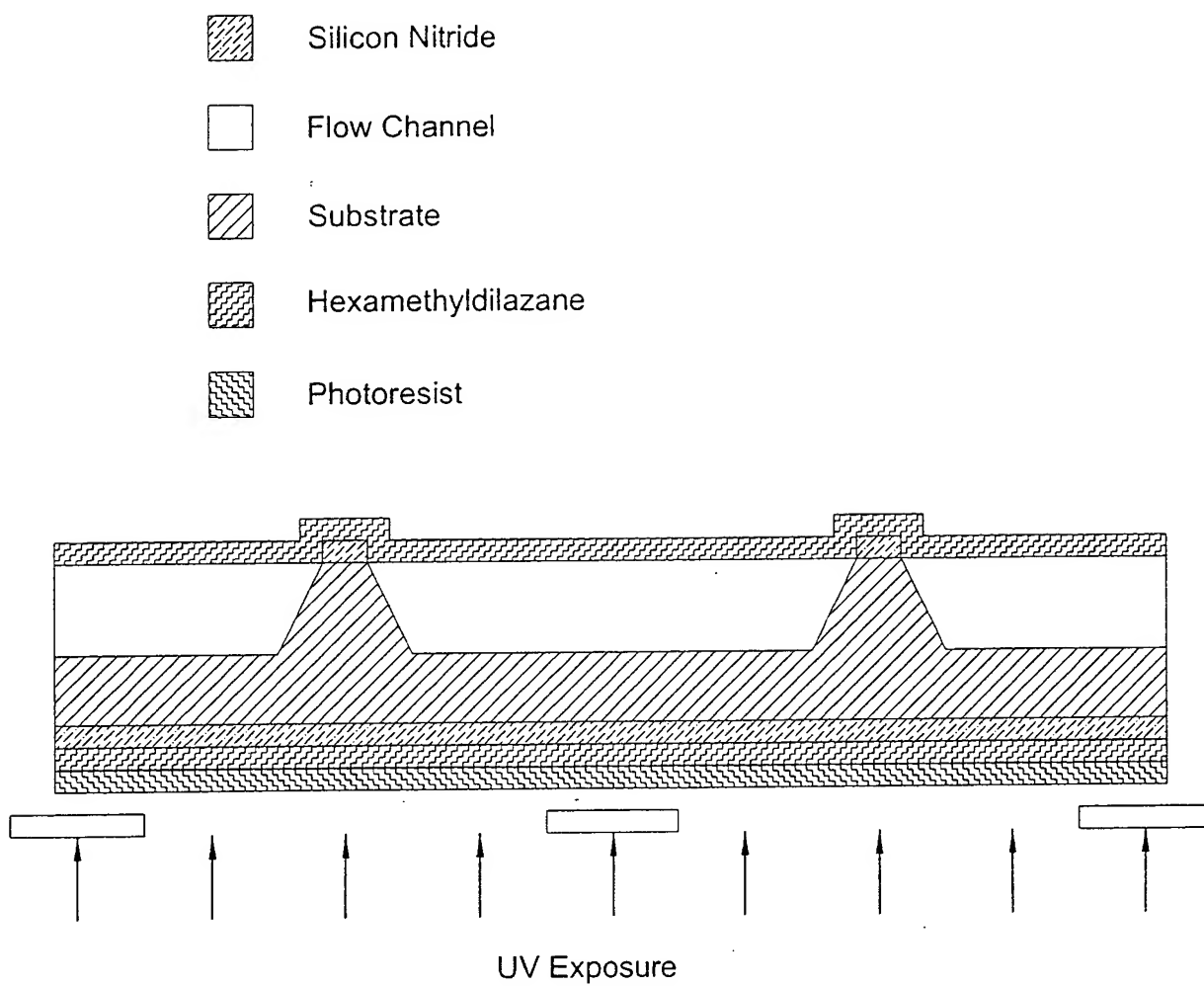
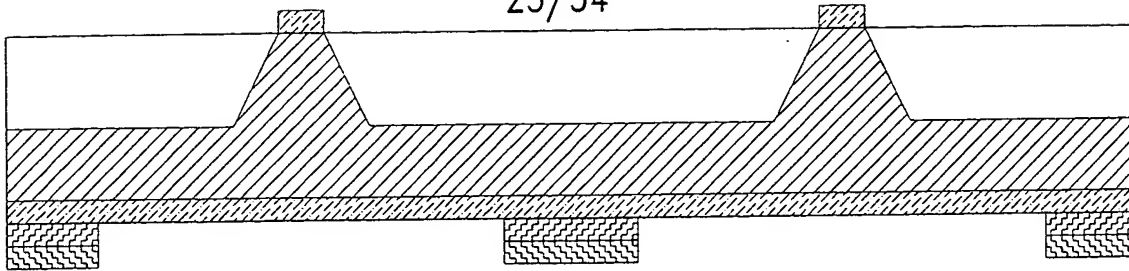


Fig. 27

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Silicon Nitride



Flow Channel



Substrate

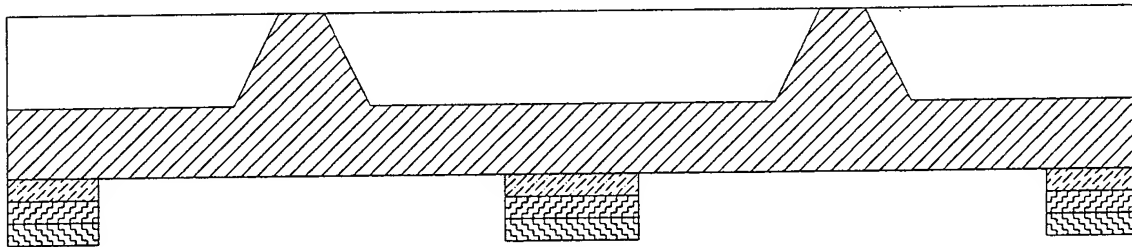


Hexamethyldilazane



Photoresist

Fig. 28



Silicon Nitride



Flow Channel



Substrate



Hexamethyldilazane



Photoresist

Fig. 29

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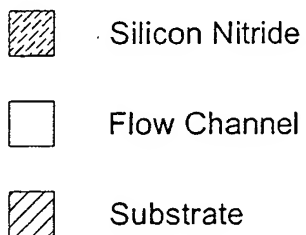
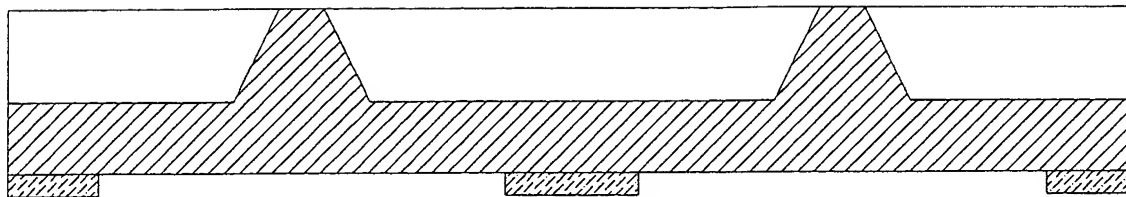


Fig. 30

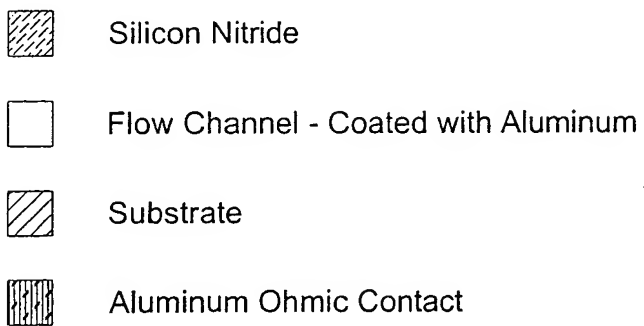
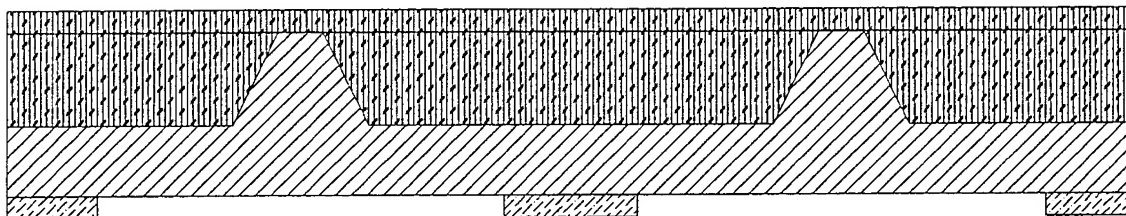
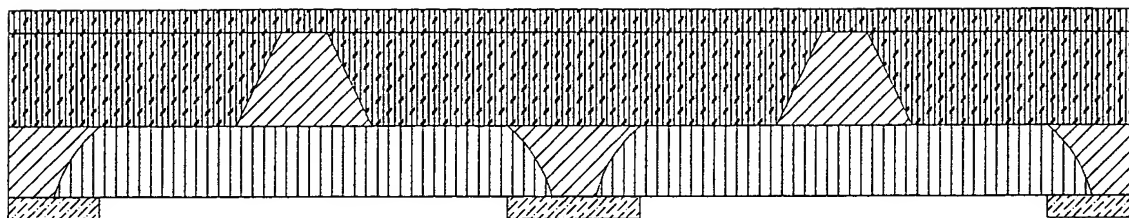


Fig. 31








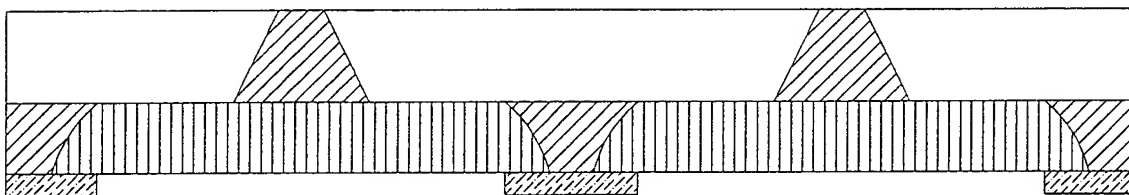
-  Silicon Nitride
-  Flow Channel - Coated with Aluminum
-  Substrate
-  Porous Silicon
-  Aluminum Ohmic Contact

Fig. 32







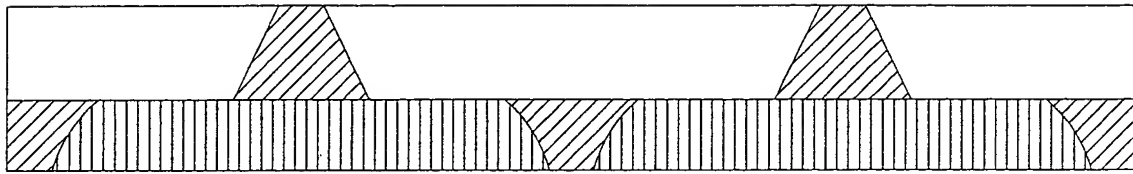
-  Silicon Nitride
-  Flow Channel
-  Substrate
-  Porous Silicon

Fig. 33

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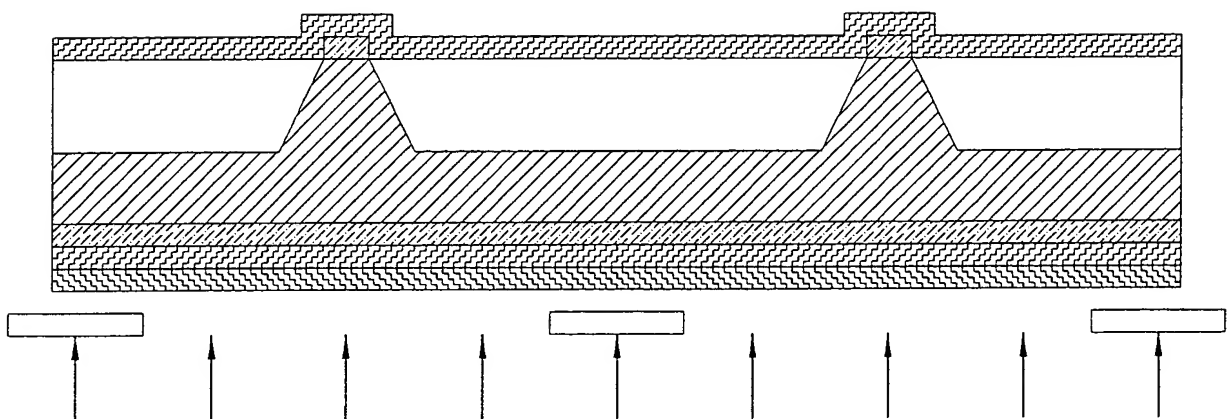
-  Flow Channel
-  Substrate
-  Porous Silicon

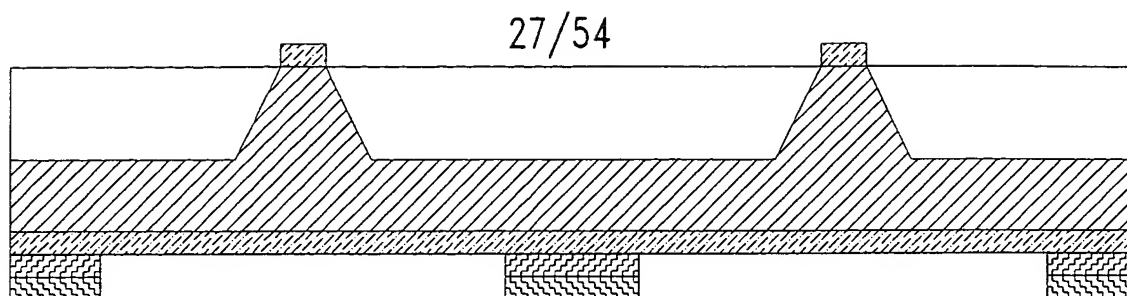
Fig. 34

-  Silicon Nitride
-  Flow Channel
-  Substrate
-  Hexamethyldilazane
-  Photoresist



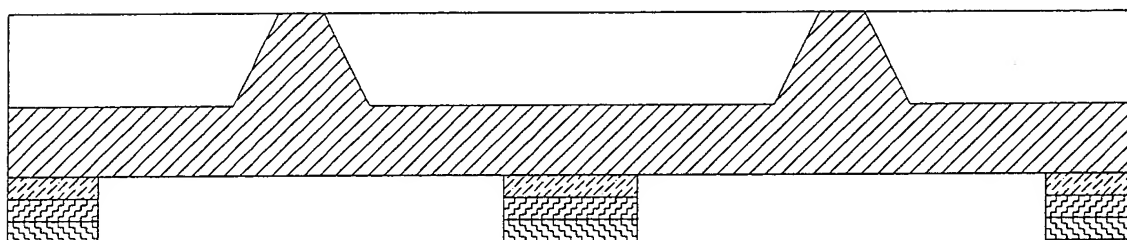
UV Exposure

Fig. 35



-  Silicon Nitride
-  Flow Channel
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 36




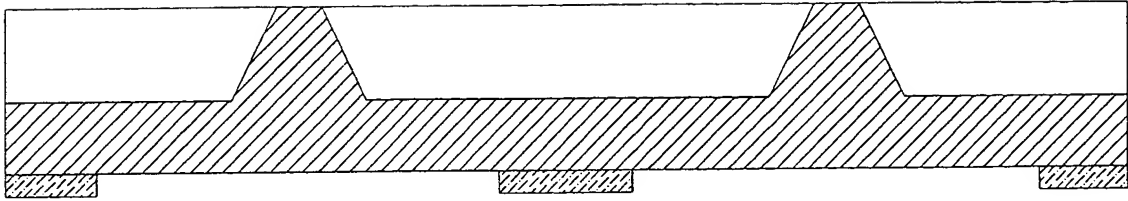
-  Silicon Nitride
-  Flow Channel
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 37

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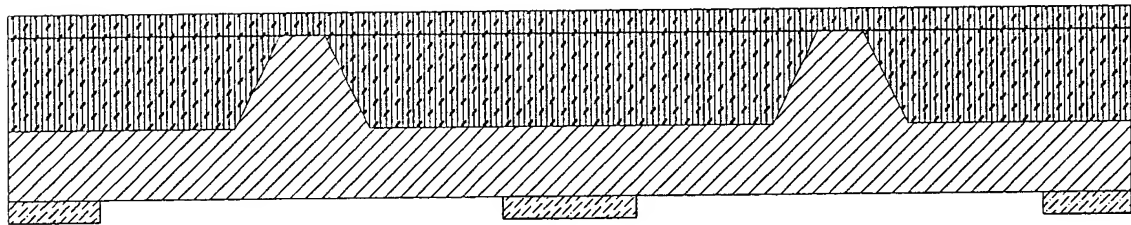
-  Silicon Nitride
-  Flow Channel
-  Substrate

Fig. 38







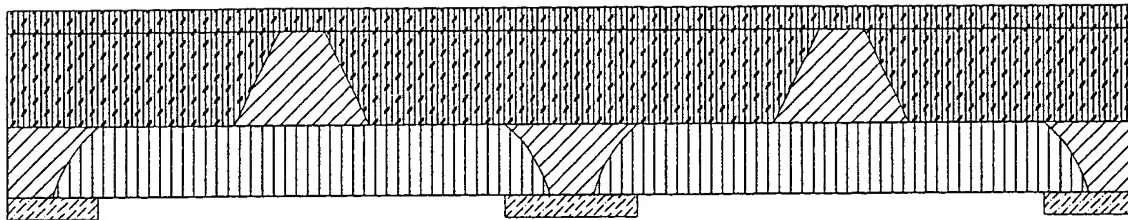
-  Silicon Nitride
-  Flow Channel - Coated with Aluminum
-  Substrate
-  Aluminum Ohmic Contact

Fig. 39



Silicon Nitride



Flow Channel - Coated with Aluminum



Substrate

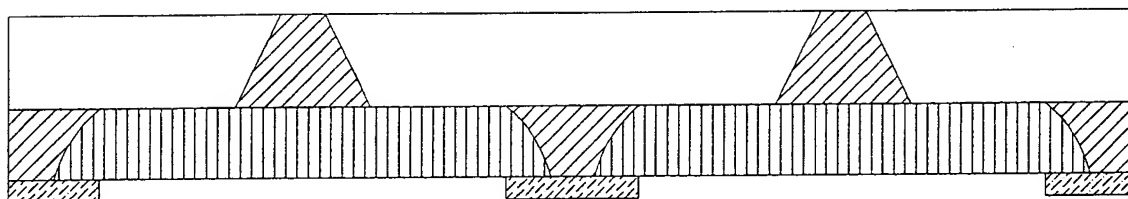


Porous Silicon



Aluminum Ohmic Contact

Fig. 40



Silicon Nitride



Flow Channel



Substrate



Porous Silicon

Fig. 41

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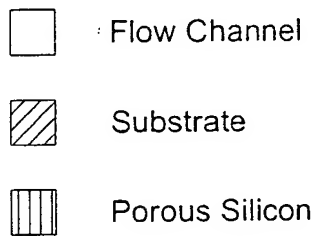
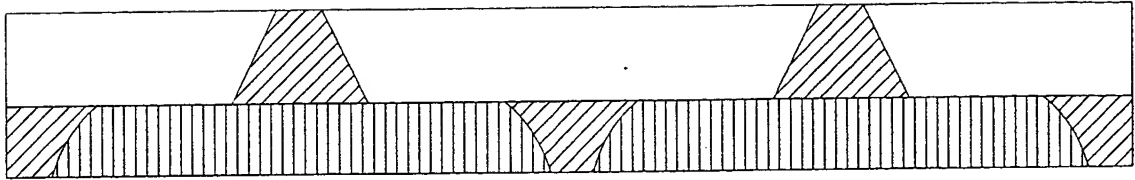


Fig. 42

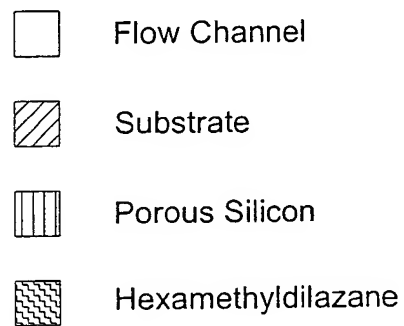
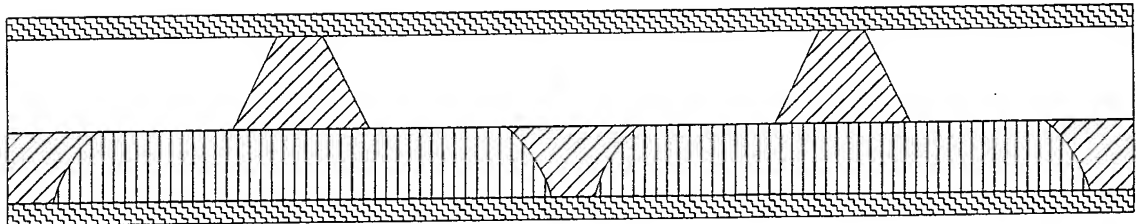
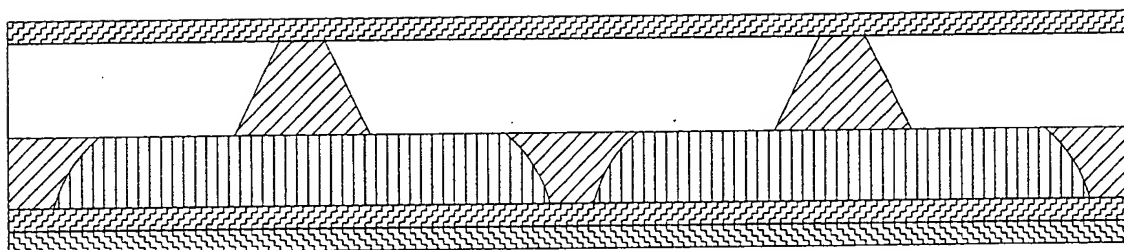


Fig. 43













-  Flow Channel
-  Substrate
-  Porous Silicon
-  Hexamethyldilazane
-  Photoresist

Fig. 44

-  Flow Channel
-  Substrate
-  Porous Silicon
-  Hexamethyldilazane
-  Photoresist

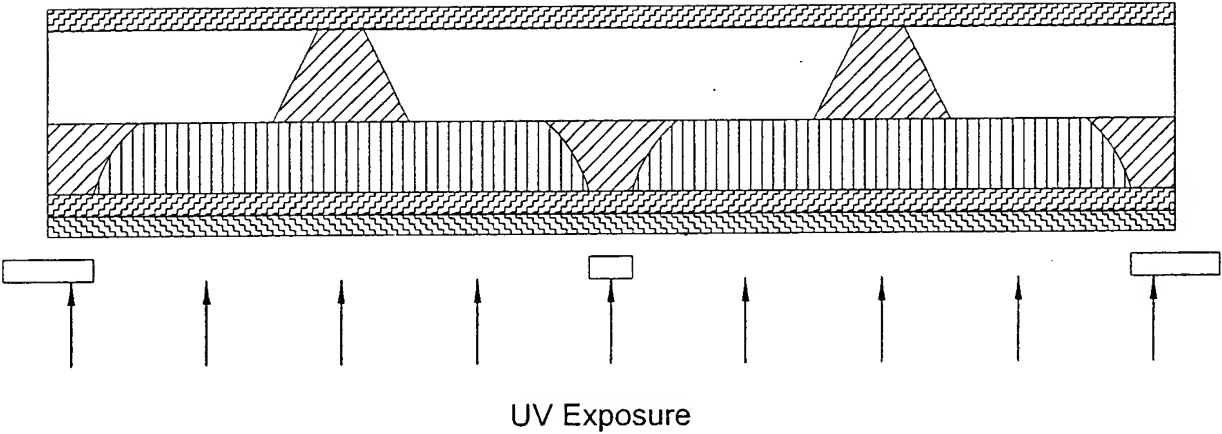
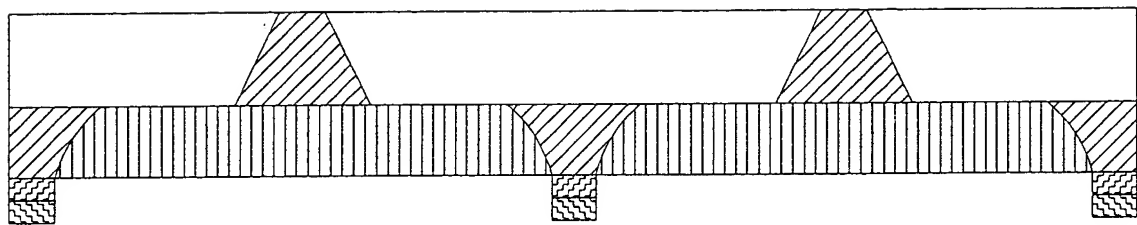


Fig. 45








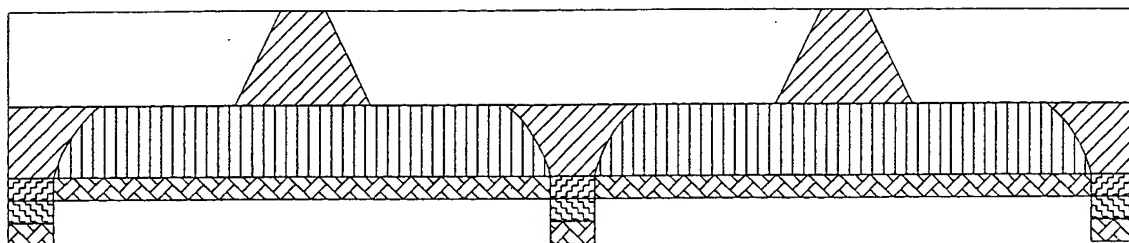
-  Flow Channel
-  Substrate
-  Porous Silicon
-  Hexamethyldilazane
-  Photoresist

Fig. 46









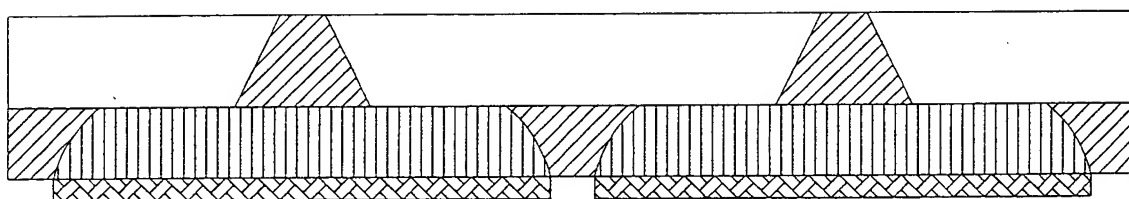
-  Flow Channel
-  Substrate
-  Porous Silicon
-  Hexamethyldilazane
-  Photoresist
-  Methanol Barrier Layer

Fig. 47







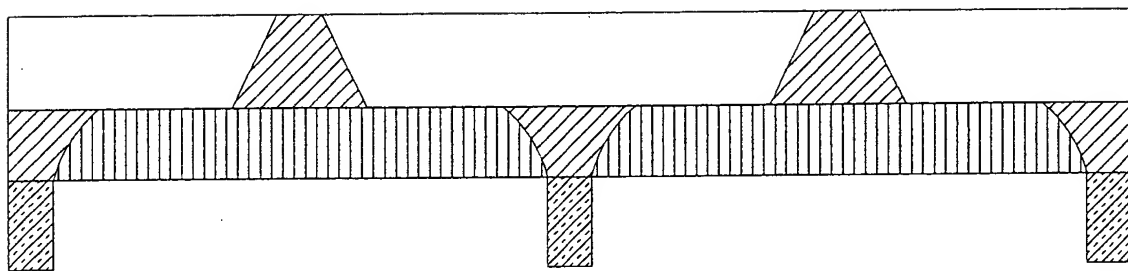
-  Flow Channel
-  Substrate
-  Porous Silicon
-  Methanol Barrier Layer

Fig. 48







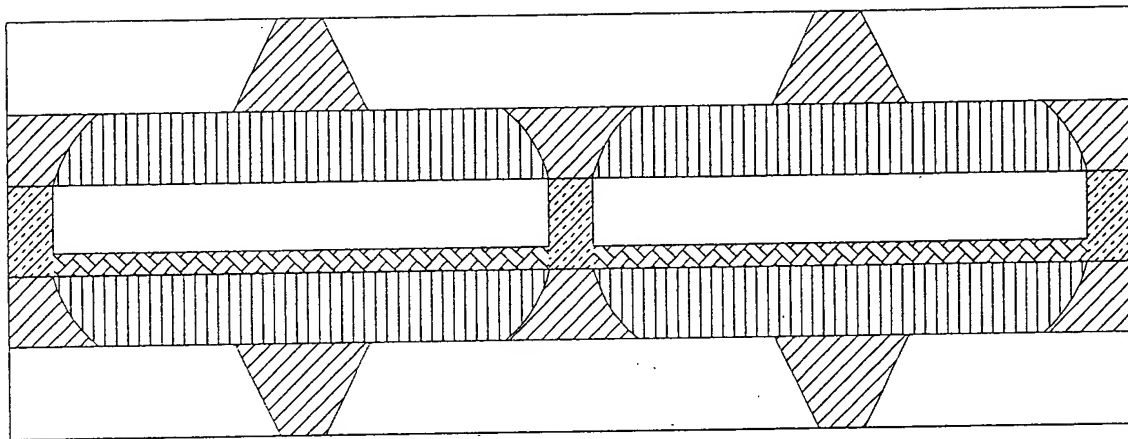
-  Flow Channel
-  Substrate
-  Porous Silicon
-  Wafer Bonding Material

Fig. 49








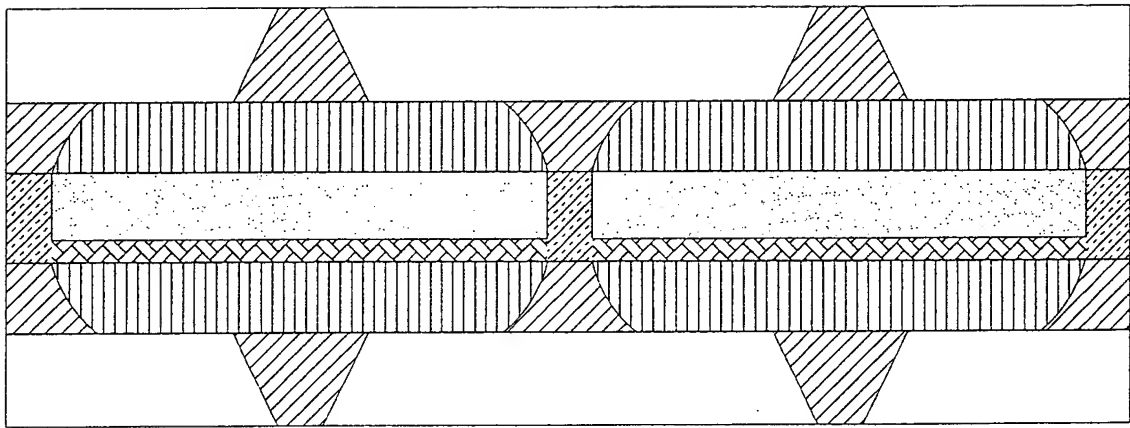
-  Flow Channel
-  Substrate
-  Porous Silicon
-  Methanol Barrier Layer
-  Wafer Bonding Material

Fig. 50









-  Flow Channel
-  Substrate
-  Porous Silicon
-  Methanol Barrier Layer
-  Wafer Bonding Material
-  Electrolyte

Fig. 51

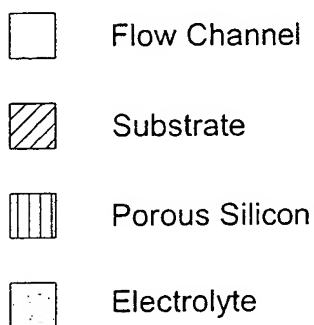
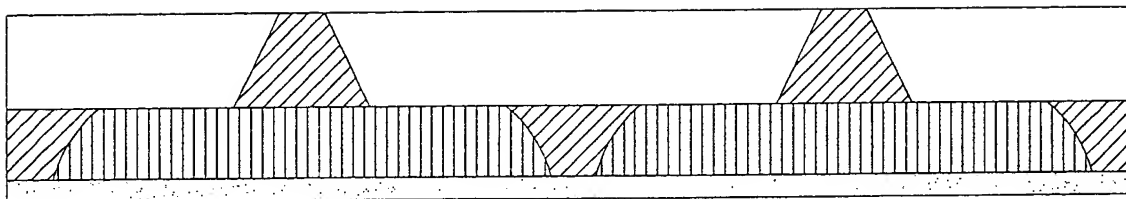


Fig. 52

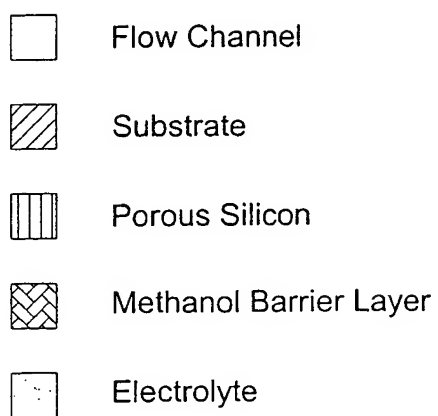
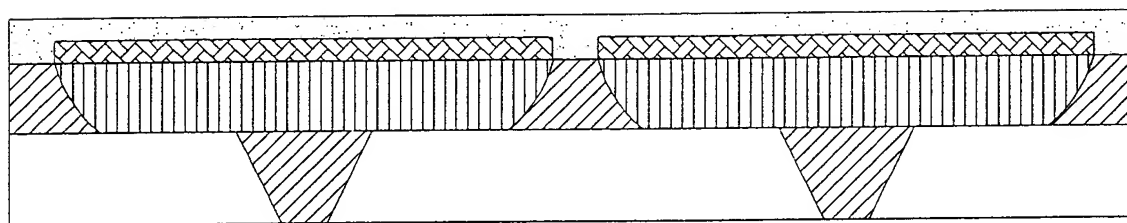
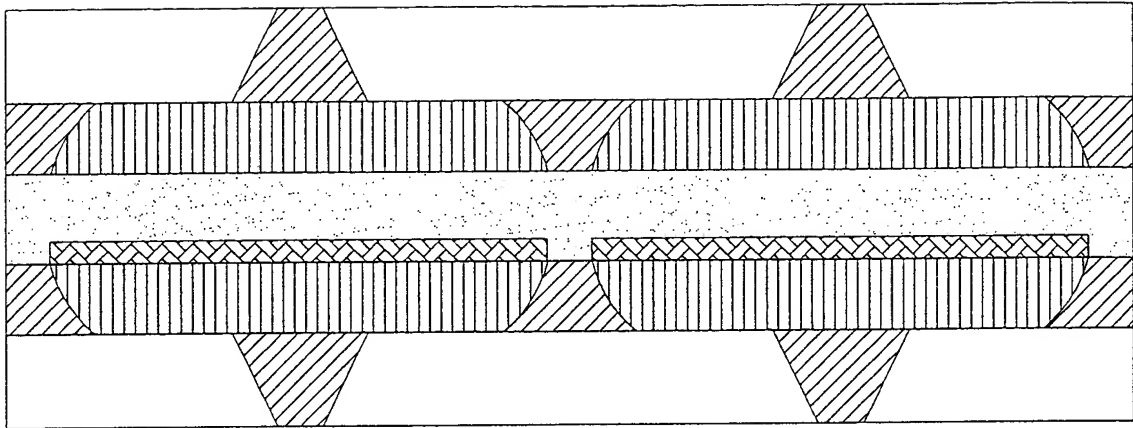





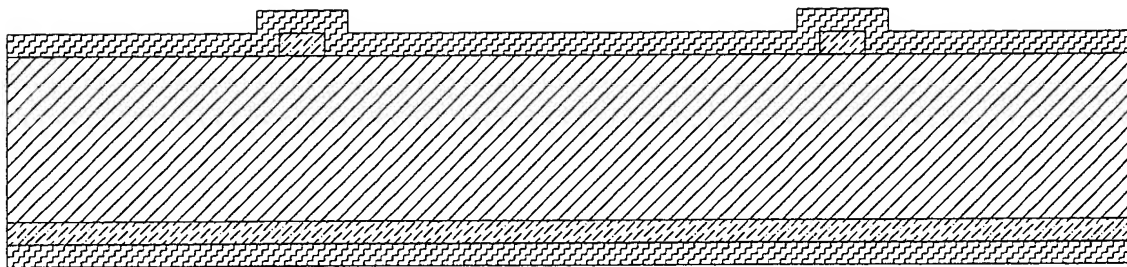


Fig. 53

*Fig. 54*

-  Flow Channel
-  Substrate
-  Porous Silicon
-  Methanol Barrier Layer
-  Electrolyte

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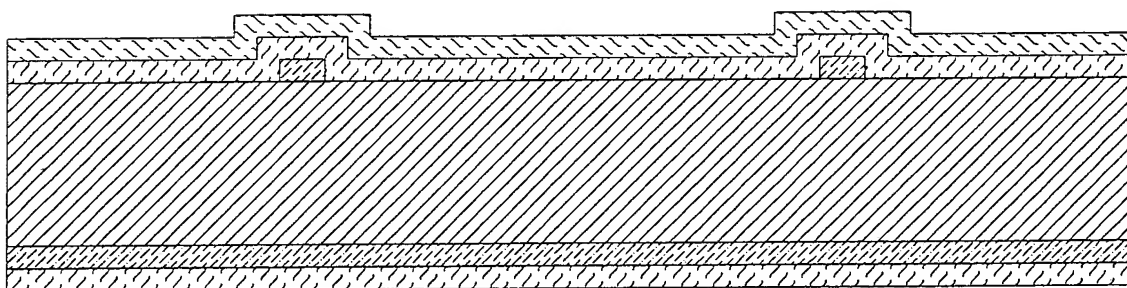
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane

Fig. 55







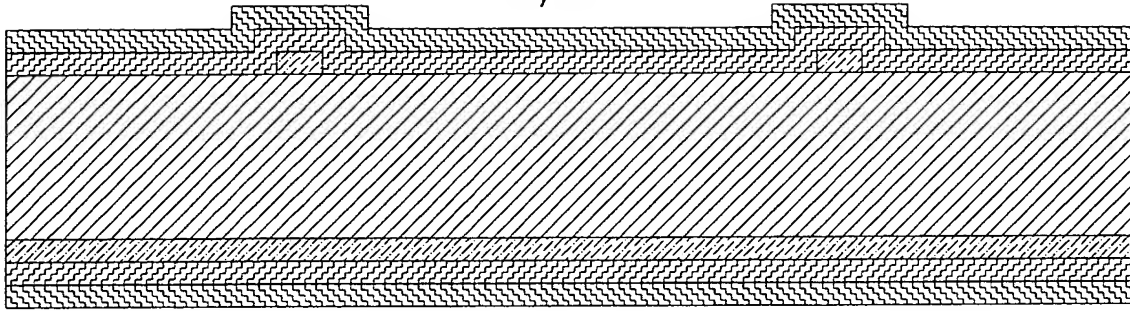
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 56

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


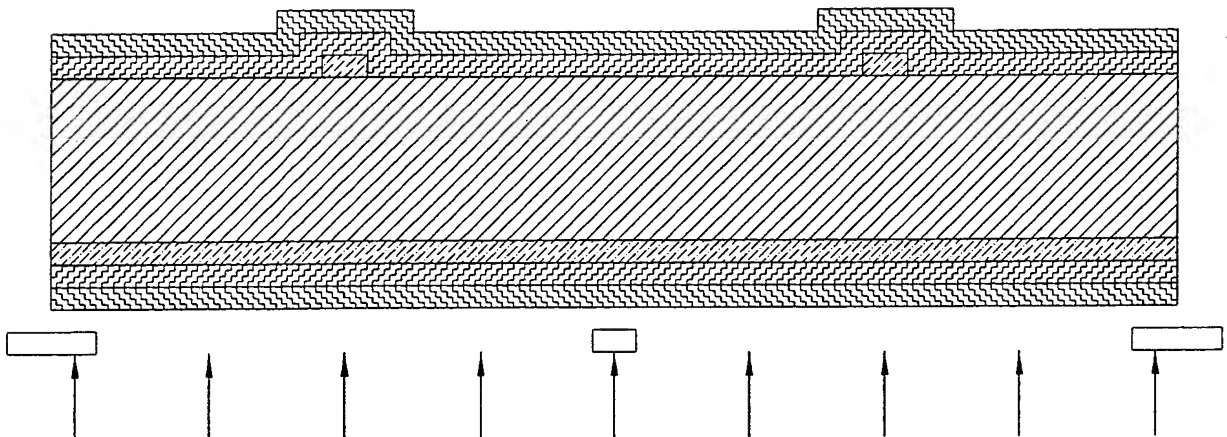
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 57

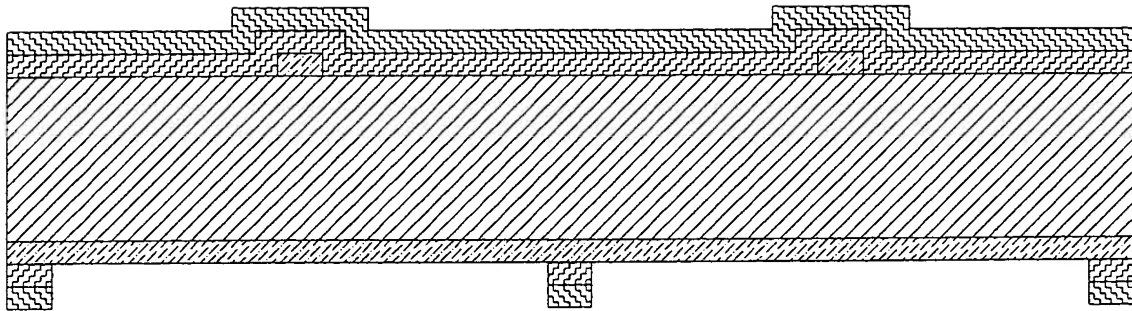
-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist



UV Exposure

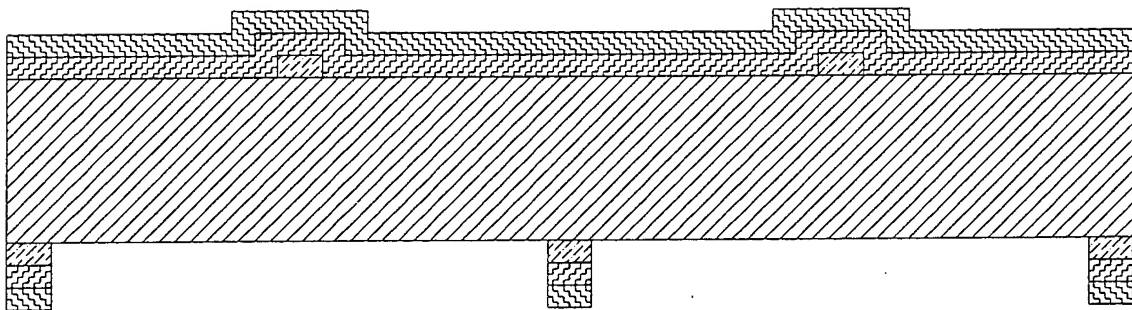
Fig. 58

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-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 59







-  Silicon Nitride
-  Substrate
-  Hexamethyldilazane
-  Photoresist

Fig. 60

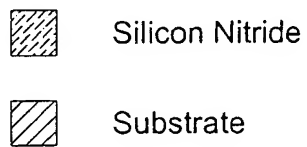
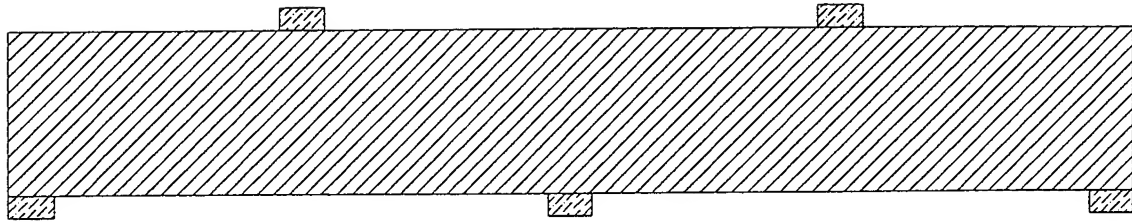


Fig. 61

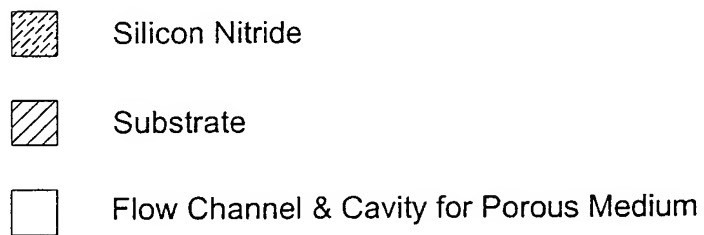
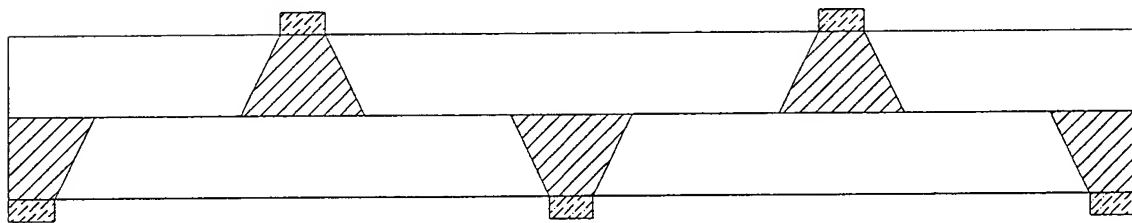
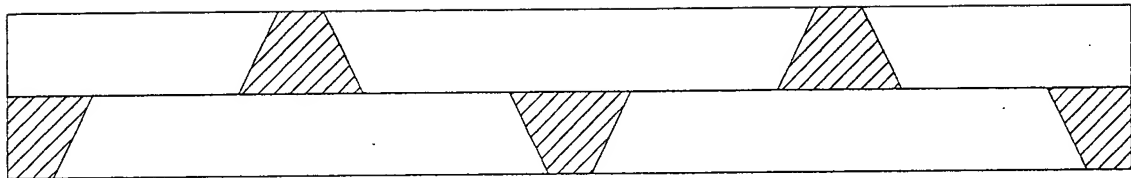


Fig. 62

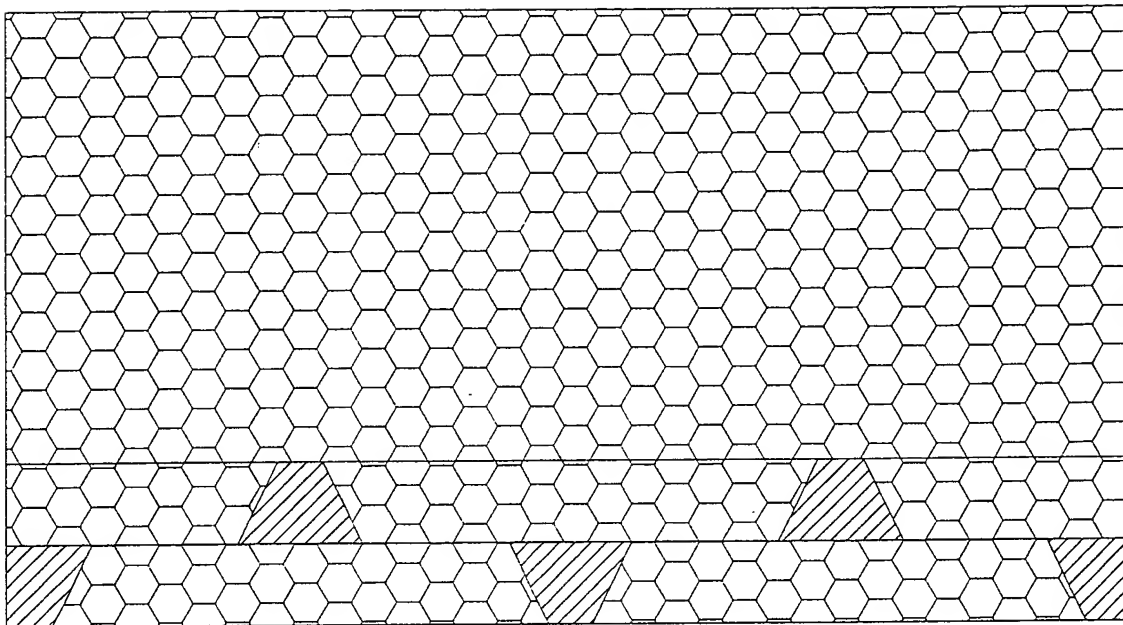


Substrate



Flow Channel & Cavity for Porous Medium

Fig. 63






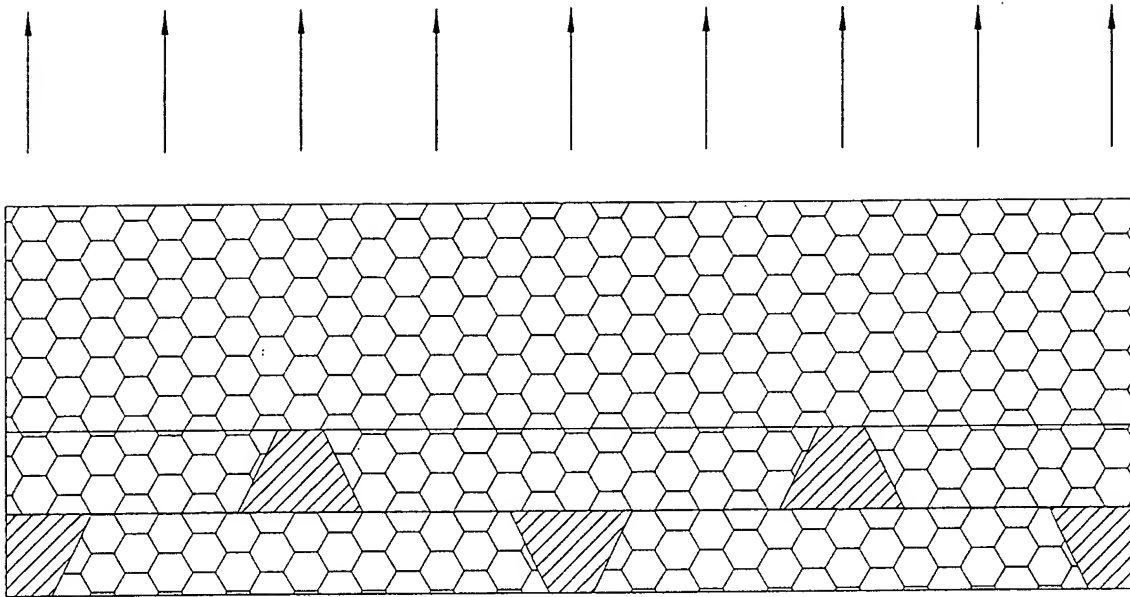
-  Substrate
-  Flow Channel & Cavity for Porous Medium
-  Sol-gel in Solution Form

Fig. 64

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Evaporation






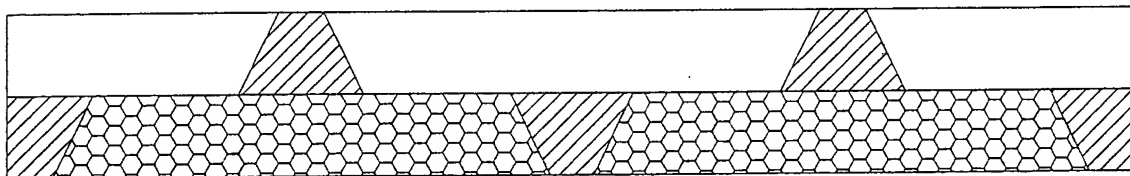
-  Substrate
-  Flow Channel & Cavity for Porous Medium
-  Sol-gel in Solution Form

Fig. 65






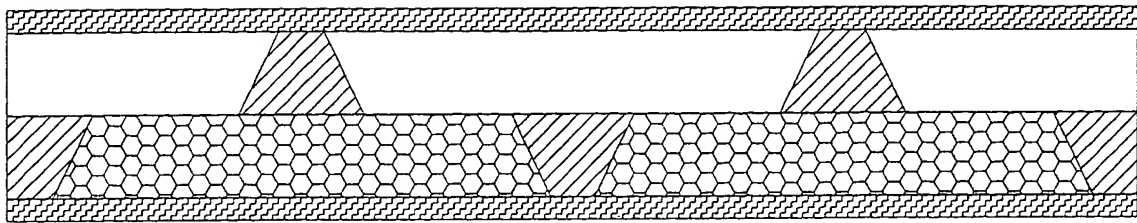
-  Substrate
-  Flow Channel
-  Sol-gel

Fig. 66

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


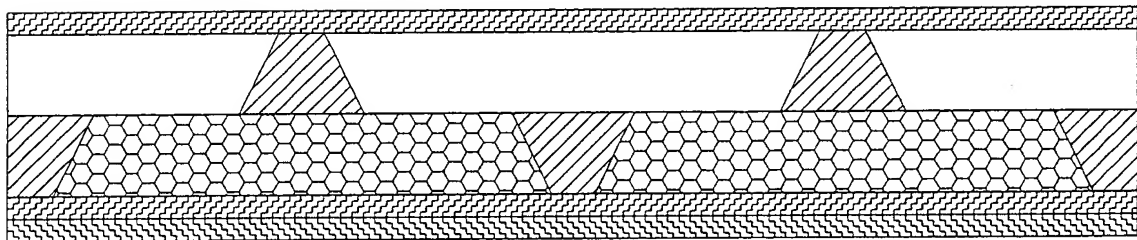
-  Substrate
-  Flow Channel
-  Sol-gel
-  Hexamethyldilazane

Fig. 67








-  Substrate
-  Flow Channel
-  Sol-gel
-  Hexamethyldilazane
-  Photoresist

Fig. 68

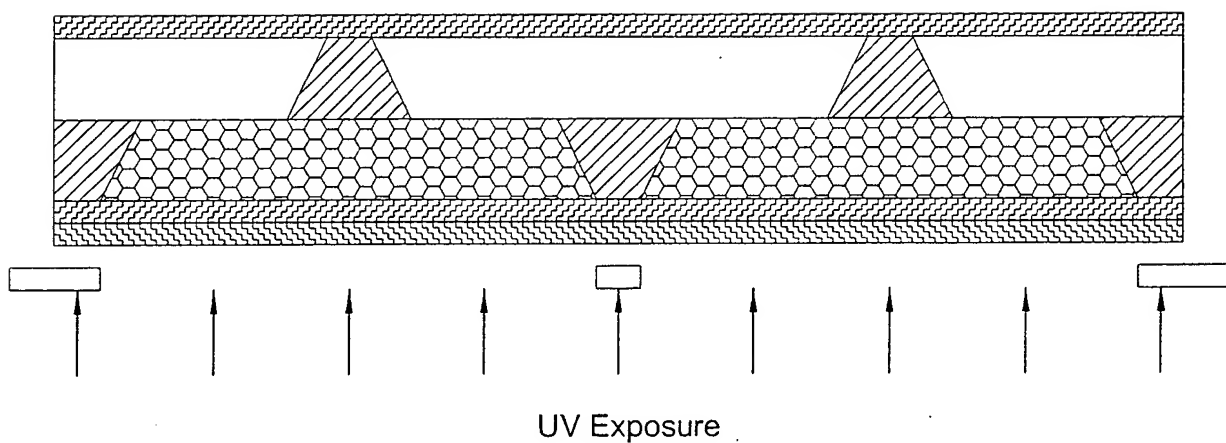
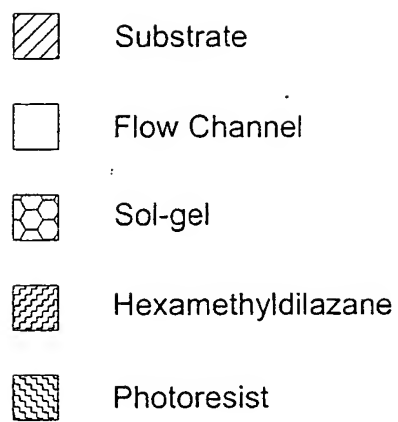
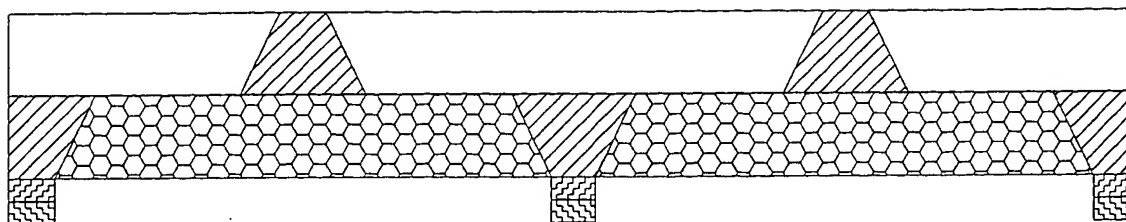


Fig. 69








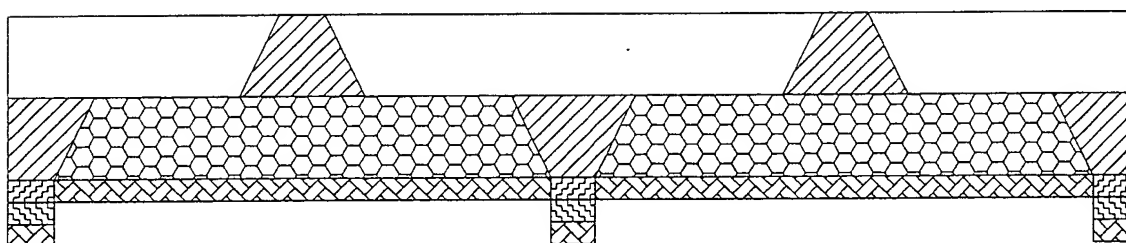
-  Substrate
-  Flow Channel
-  Sol-gel
-  Hexamethyldilazane
-  Photoresist

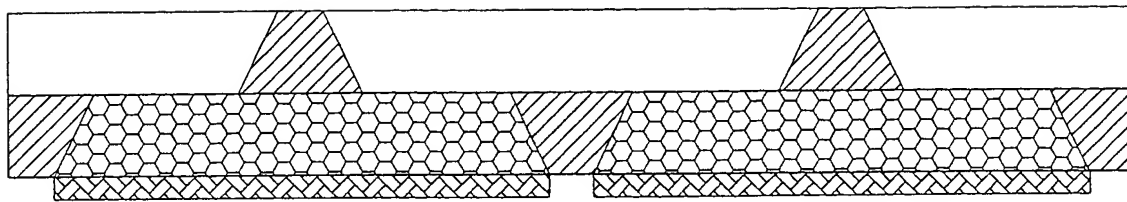
Fig. 70



-  Substrate
-  Flow Channel
-  Sol-gel
-  Hexamethyldilazane
-  Photoresist
-  Methanol Barrier Layer

Fig. 71

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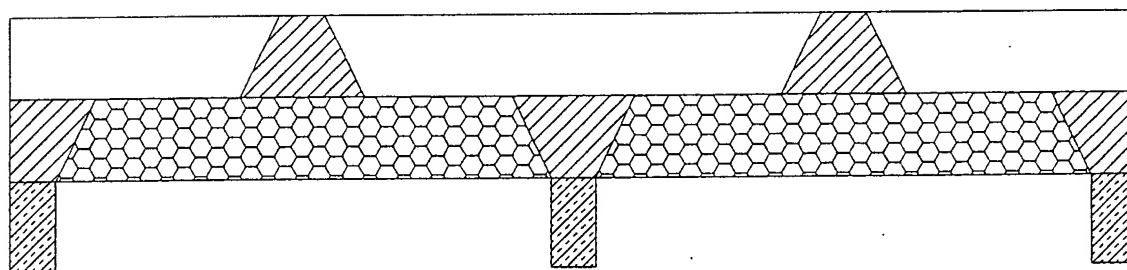
-  Substrate
-  Flow Channel
-  Sol-gel
-  Methanol Barrier Layer

Fig. 72







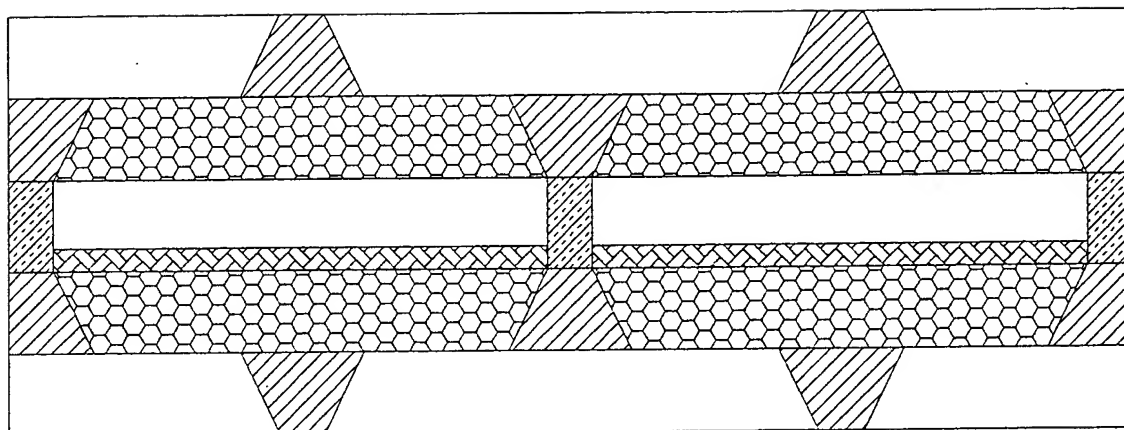
-  Substrate
-  Flow Channel & Cavity for Porous Medium
-  Sol-gel
-  Wafer Bonding Material

Fig. 73








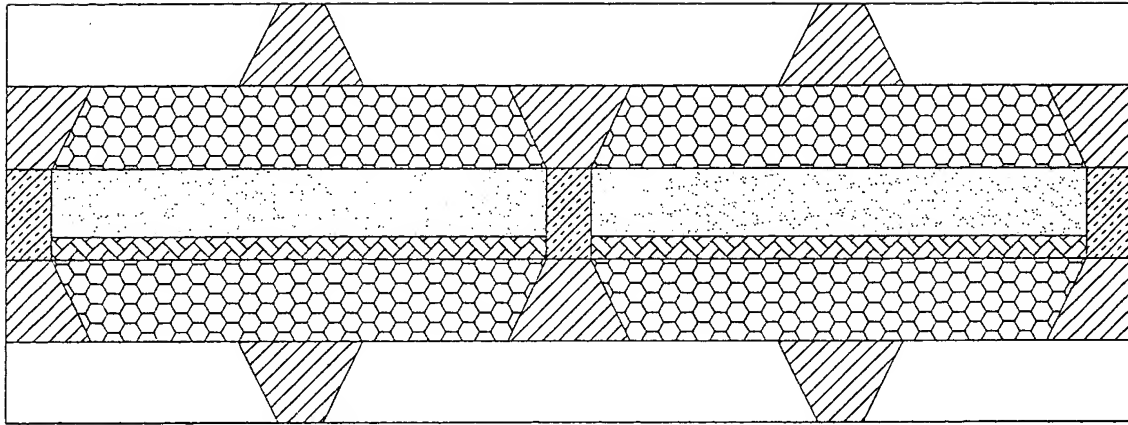
-  Substrate
-  Flow Channel
-  Sol-gel
-  Wafer Bonding Material
-  Methanol Barrier Layer

Fig. 74









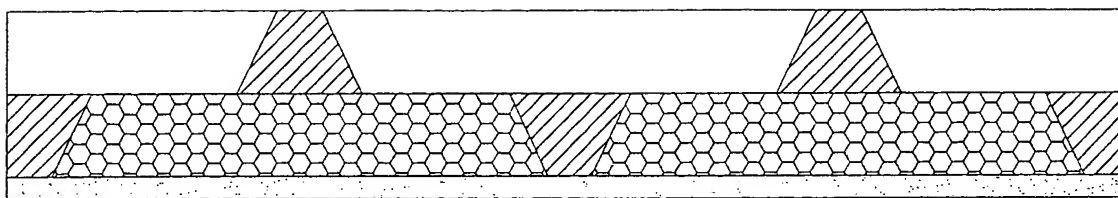
-  Substrate
-  Flow Channel
-  Sol-gel
-  Wafer Bonding Material
-  Methanol Barrier Layer
-  Electrolyte

Fig. 75







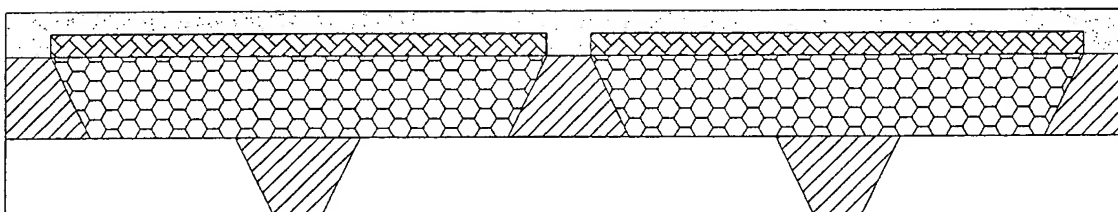
-  Substrate
-  Flow Channel & Cavity for Porous Medium
-  Sol-gel
-  Electrolyte

Fig. 76








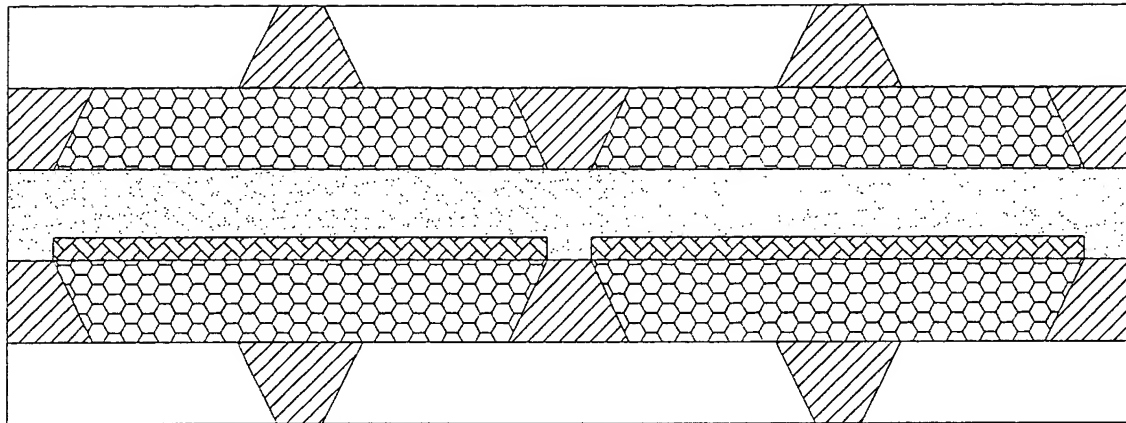
-  Substrate
-  Flow Channel
-  Sol-gel
-  Electrolyte
-  Methanol Barrier Layer

Fig. 77








-  Substrate
-  Flow Channel
-  Sol-gel
-  Electrolyte
-  Methanol Barrier Layer

Fig. 78